The Communicator

November—December 2022

SARC

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Issues appear bi-monthly, on odd-numbered months, for area Amateur Radio operators and beyond, to enhance the exchange of information and to promote ham radio activity.

During non-publication months we encourage you to visit the Digital Communicator at **ve7sar.blogspot.ca**, which includes recent news, past issues of ***The Communicator***, our history, photos, videos and other information.

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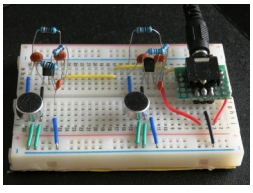
If you find ***The Communicator*** worthwhile, regular readers who are not SARC members are invited to contribute a $5 annual donation towards our Field Day fund via PayPal.

SARC maintains a website at **www.ve7sar.net**

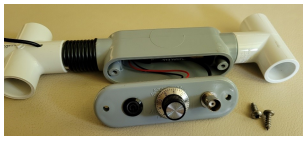
DEPARTMENTS

IN THIS ISSUE



Daniel Romila is back with several projects and information on a variety of electronics.

A 2m tape measure fox Yagi with attenuator



Peter VE7AFV on "Experimenting with over-the-air TV signals in a streaming world".

...and so much more!

QRM -- -.- .-. --

...from the Editor's Shack

Do you have a photo or bit of Ham news to share? An Interesting link?

Something to sell or something you are looking for?
*eMail it to **communicator at ve7sar.net** for inclusion in this publication.*

It has been another busy two months since our last issue. We have managed to repair our 100-foot mobile tower and in the process invested in new tires, brakes and a regulator for the generator. This thing is a monster and takes a heavy duty pickup to tow it, so road safety is an important consideration and it is money well spent.

To finance our programs we are indeed fortunate to have a steady stream of students for our Canadian Basic on-line certification courses and our reputation seems to have spread throughout Canada and now the United States as we train our first American students. Cross-border participation is not new though as we have already graduated a student who joined us from Mexico last year.

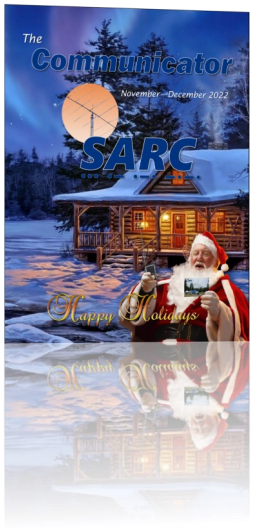
COVID, and what we at first thought was a blow to our ability to offer instruction has instead opened up a range of new possibilities and we find students embrace the opportunity for on-line learning from the comfort of their home and without the necessity of a commute.

Were it not for the income that our courses generate we would not have the quality stations and antennas that we now own, and the ability to support our local emergency program.

Let me conclude this final issue of 2022 by thanking our SARC members, and by wishing all of our readers worldwide a happy holiday season and all the best for a happy and healthy 2023 ahead.

73,

~ John VE7TI, Editor
communicator@ve7sar.net



This Month's Cover...

Another year passed and an opportunity to wish all our readers the very best for the coming holiday season.

"Be at war with your vices, at peace with your neighbors, and let every new year find you a better man."— *Benjamin Franklin*

On the Web

ve7sar.net

Between Communicators, watch your e-mail for news, announcements of Amateur Radio events, monthly meetings and training opportunities.

Click the links below to follow our presence on the web and social media:

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Web Albums
or
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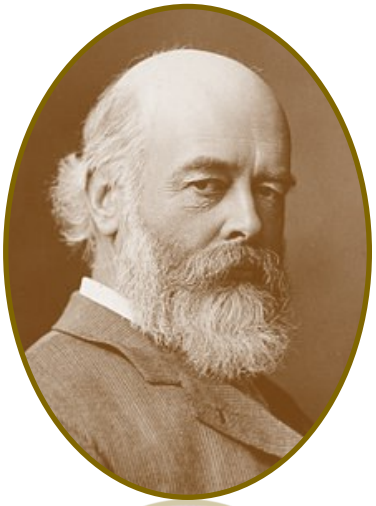
The Rest Of The Story...

ElectroMagnetic Wave Theory



Oliver Lodge

Oliver Lodge was born in 1851 at 'The Views', Penkhull, then a rural village high above the emerging Potteries of North Staffordshire in what is now Stoke-on-Trent, and educated at Adams' Grammar School, Newport, Shropshire. His parents were Oliver Lodge (1826–1884) – later a ball clay merchant at Wolstanton, Staffordshire – and his wife, Grace, née Heath (1826–1879). Lodge was their first child, and altogether they had eight sons and a daughter. Lodge's siblings included Sir Richard Lodge (1855–1936), historian; Eleanor Constance Lodge (1869–1936), historian and principal of Westfield College, London; and Alfred Lodge (1854–1937), mathematician.

When Lodge was 12, the family moved house a short distance north along the valley ridge, to Wolstanton. There, at Moreton House on the southern tip of Wolstanton Marsh, he took over a large outbuilding for his first scientific experiments during the long school holidays.

In 1865, Lodge, at the age of 14, left his schooling and entered his father's business (Oliver Lodge & Son) as an agent for B. Fayle & Co selling Purbeck blue clay to the pottery manufacturers. This work sometimes entailed him travelling as far as Scotland. He continued to assist his father until he reached the age of 22.

His father's growing wealth from trade enabled him to move the family to Chatterley House, Hanley, when Lodge was 18. From there Lodge attended physics lectures in London, and also attended the Wedgwood Institute in nearby Burslem. At Chatterley House, just a mile south of Etruria Hall where Wedgwood had experimented, Lodge's Autobiography recalled that "something like real experimentation" began for him around 1869.

Growing increasingly affluent in a booming industrial economy, the family moved again in 1875 – this time to the nearby Watlands Hall at the top of Porthill Bank between Middleport and Wolstanton (demolished 1951). Lodge obtained a Bachelor of Science degree from the University of London in 1875 and gained the title of Doctor of Science in 1877. At Wolstanton he experimented with producing a wholly new "electromagnetic light"

in 1879 and 1880, paving the way for later experimental success. During this time, he also lectured at Bedford College, London.

Lodge left the Potteries district in 1881, to take the post of Professor of Physics and Mathematics at the newly founded University College, Liverpool. In 1900 Lodge moved from Liverpool back to the Midlands and became the first principal of the new Birmingham University, remaining there until his retirement in 1919. He oversaw the start of the move of the university from Edmund Street in the city centre to its present Edgbaston campus. Lodge was awarded the Rumford Medal of the Royal Society in 1898, and was knighted in the 1902 Coronation Honours, receiving the accolade from King Edward VII at Buckingham Palace on 24 October that year. In 1928 he was made Freeman of his native city, Stoke-on-Trent.

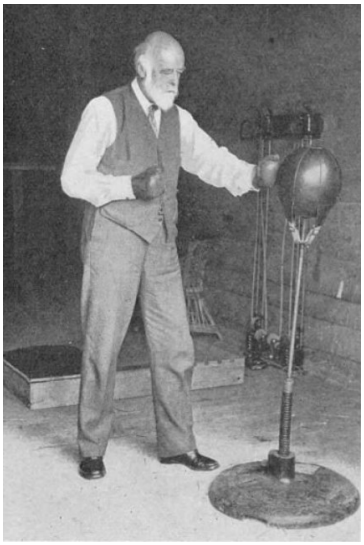
Lodge married Mary Fanny Alexander Marshall at St George's Church, Newcastle-under-Lyme in 1877. They had twelve children, six boys and six girls, including Oliver William Foster and Alec. Four of his sons went into business using Lodge's inventions. Brodie and Alec created the Lodge Plug Company, which manufactured spark plugs for cars and aeroplanes. Lionel and Noel founded a company that produced an electrostatic device for cleaning factory and smelter smoke in 1913, called the Lodge Fume Deposit Company Limited (changed in 1919 to Lodge Fume Company Limited and in 1922, through agreement with the International Precipitation Corporation of California, to Lodge Cottrell Ltd). Oliver, the eldest son, became a poet and author.

After his retirement in 1920, Lodge and his wife settled in Normanton House, near Lake in Wiltshire, a few miles from Stonehenge. Lodge and his wife are buried at the local parish church, St. Michael's, Wilsford cum Lake. Their eldest son Oliver and eldest daughter Violet are buried at the same church

Electromagnetism and radio

In 1873 J. C. Maxwell published A Treatise on Electricity and Magnetism, and by 1876 Lodge was studying it intently. But Lodge was fairly limited in mathematical physics both by aptitude and training, and his first two papers were a description of a mechanism (of beaded strings and pulleys) that could serve to illustrate electrical phenomena such as conduction and polarization. Indeed, Lodge is probably best known for his advocacy and elaboration of Maxwell's aether theory – a later deprecated model postulating a wave-bearing medium filling all space. He explained his views on the aether in "Modern Views of Electricity" (1889) and continued to defend those ideas well into the twentieth century ("Ether and Reality", 1925).

As early as 1879, Lodge became interested in generating (and detecting) electromagnetic waves, something Maxwell had never considered. This interest continued throughout the 1880s, but some



Lodge keeping fit at his home in 1930

"As early as 1879, Lodge became interested in generating (and detecting) electromagnetic waves..."

obstacles slowed Lodge's progress. First, he thought in terms of generating light waves with very high frequencies rather than radio waves with their much lower frequencies. Second, his good friend George FitzGerald (on whom Lodge depended for theoretical guidance) assured him (incorrectly) that "ether waves could not be generated electromagnetically." FitzGerald later corrected his error, but, by 1881, Lodge had assumed a teaching position at University College, Liverpool the demands of which limited his time and his energy for research.

In 1887 the Royal Society of Arts asked Lodge to give a series of lectures on lightning, including why lightning rods and their conducting copper cable sometimes do not work, with lightning strikes following alternate paths, going through (and damaging) structures, instead of being conducted by the cables. Lodge took the opportunity to carry out a scientific investigation, simulating lightning by discharging Leyden jars into a long length of copper wire. Lodge found the charge would take a shorter high resistance route jumping a spark gap, instead of taking a longer low resistance route through a loop of copper wire. Lodge presented these first results, showing what he thought was the effect of inductance on the path lightning would take, in his May 1888 lecture.

In other experiments that spring and summer, Lodge put a series of spark gaps along two 29 meter (95') long wires and noticed he was getting a very large spark in the gap near the end of the wires, which seemed to be consistent with the oscillation wavelength produced by the Leyden jar meeting with the wave being reflected at the end of the wire. In a darkened room, he also noted a glow at intervals along the wire at one half wavelength intervals. He took this as evidence that he was generating and detecting Maxwell's electromagnetic waves. While traveling on a vacation to the Tyrolean Alps in July 1888, Lodge read in a copy of Annalen der Physik that Heinrich Hertz in Germany had been conducting his own electromagnetic research, and that he had published a series of papers proving the existence of electromagnetic waves and their propagation in free space. Lodge presented his own paper on electromagnetic waves along wires in September 1888 at the British Science Association meeting in Bath, England, adding a postscript acknowledging Hertz's work and saying: "The whole subject of electrical radiation seems working itself out splendidly."

On 1 June 1894, at a meeting of the British Association for the Advancement of Science at Oxford University, Lodge gave a memorial lecture on the work of Hertz (recently deceased) and the German physicist's proof of the existence of electromagnetic waves 6 years earlier. Lodge set up a demonstration on the quasi optical nature of "Hertzian waves" (radio waves) and demonstrated their similarity to light and vision including reflection and transmission. Later in June and on 14 August 1894 he did similar experiments, increasing the distance of transmission up to 55 meters (180'). Lodge used a detector called a coherer (invented by Edouard Branly), a glass tube containing metal filings between two electrodes. When the small electrical charge from

waves from an antenna were applied to the electrodes, the metal particles would cling together or "cohere" causing the device to become conductive allowing the current from a battery to pass through it. In Lodge's setup the slight impulses from the coherer were picked up by a mirror galvanometer which would deflect a beam of light being projected on it, giving a visual signal that the impulse was received. After receiving a signal the metal filings in the coherer were broken apart or "decohered" by a manually operated vibrator or by the vibrations of a bell placed on the table near by that rang every time a transmission was received. Since this was one year before Marconi's 1895 demonstration of a system for radio wireless telegraphy and contained many of the basic elements that would be used in Marconi's later wireless systems, Lodge's lecture became the focus of priority disputes with the Marconi Company a little over a decade later over invention of wireless telegraphy (radio). At the time of the dispute some, including the physicist John Ambrose Fleming, pointed out that Lodge's lecture was a physics experiment, not a demonstration of telegraphic signaling. Lodge would later work with Alexander Muirhead on the development of devices specifically for wireless telegraphy.

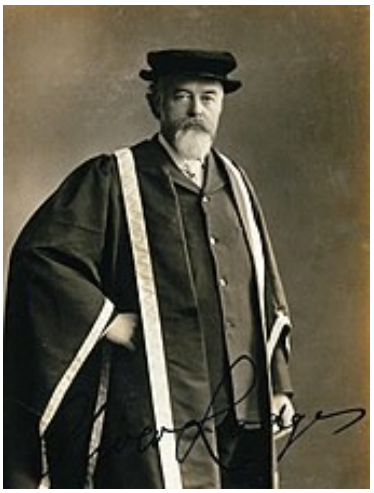
In January 1898 Lodge presented a paper on "syntonic" tuning which he received a patent for that same year. Syntonic tuning allowed specific frequencies to be used by the transmitter and receiver in a wireless communication system. The Marconi Company had a similar tuning system adding to the priority dispute over the invention of radio. When Lodge's syntonic patent was extended in 1911 for another 7 years Marconi agreed to settle the patent dispute, purchasing the syntonic patent in 1912 and giving Lodge an (honorific) position as "scientific adviser".

Other works

In 1886 Lodge developed the moving boundary method for the measurement in solution of an ion transport number, which is the fraction of electric current carried by a given ionic species.

Lodge carried out scientific investigations on the source of the electromotive force in the Voltaic cell, electrolysis, and the application of electricity to the dispersal of fog and smoke. He also made a major contribution to motoring when he patented a form of electric spark ignition for the internal combustion engine (the Lodge Igniter). Later, two of his sons developed his ideas and in 1903 founded Lodge Bros, which eventually became known as Lodge Plugs Ltd. He also made discoveries in the field of wireless transmission. In 1898, Lodge gained a patent on the moving-coil loudspeaker, utilizing a coil connected to a diaphragm, suspended in a strong magnetic field.

In political life, Lodge was an active member of the Fabian Society, and published two Fabian Tracts:



Lodge circa 1910–1915

Socialism & Individualism (1905), and Public Service versus Private Expenditure, co-authored with Sidney Webb, George Bernard Shaw and Sidney Ball. They invited him several times to lecture at the London School of Economics.

In 1889 Lodge was appointed President of the Liverpool Physical Society, a position he held until 1893. The society still runs to this day, though under a student body. In 1901, he was elected as a member of the American Philosophical Society.

Lodge was President of the British Association in 1912–1913. In his 1913 Presidential Address to the Association, he affirmed his belief in the persistence of the human personality after death, the possibility of communicating with disembodied intelligent beings, and the validity of the aether theory.

Retirement and Death

After his retirement in 1920, Lodge and his wife settled in Normanton House, near Lake in Wiltshire, just a few miles from Stonehenge. Oliver Lodge died on 22 August 1940, at age 89.

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The coherer as developed by Marconi consisted of metal filings (dots) enclosed between two slanted electrodes (black) a few millimeters apart, connected to terminals.

The Coherer

The behavior of particles or metal filings in the presence of electricity or electric sparks was noticed in many experiments well before Édouard Branly's 1890 paper and even before there was proof of the theory of electromagnetism. In 1835 Swedish scientist Peter Samuel Munk noticed a change of resistance in a mixture of metal filings in the presence of spark discharge from a Leyden jar. In 1850 Pierre Guitard found that when dusty air was electrified, the particles would tend to collect in the form of strings. The idea that particles could react to electricity was used in English engineer Samuel Alfred Varley's 1866 lightning bridge, a lightning arrester attached to telegraph lines consisting of a piece of wood with two metal spikes extending into a chamber. The space was filled with powdered carbon that would not allow the low voltage telegraph signals to pass through but it would conduct and ground a high voltage lightning strike. In 1879 the Welsh scientist David Edward Hughes found that loose contacts between a carbon rod and two carbon blocks as well as the metallic granules in a microphone he was developing responded to sparks generated in a nearby apparatus. Temistocle Calzecchi-Onesti in Italy began studying the anomalous change in the resistance of thin metallic films and metal particles at Fermo/ Monterubbiano. He found that copper filings between two brass plates would cling together, becoming conductive, when he applied a voltage to them. He also found that other types of metal filings would have the same reaction to electric sparks occurring at a distance, a phenomenon that he thought could be used for detecting lightning strikes. Calzecchi-Onesti's papers were published in il Nuovo Cimento in 1884, 1885 and 1886.

Branly's electrical circuit tube filled with iron filings (later called a "coherer")

In 1890, French physicist Édouard Branly published On the Changes in Resistance of Bodies under Different Electrical Conditions in a French Journal where he described his thorough investigation of the effect of minute electrical charges on metal and many types of metal filings. In one type of circuit, filings were placed in a tube of glass or ebonite, held between two metal plates. When an electric discharge was produced in the neighbourhood of the circuit, a large deviation was seen on the attached galvanometer needle. He noted the filings in the tube would react to the electric discharge even when the tube was placed in another room 20 yards away. Branly went on to devise many types of these devices based on "imperfect" metal contacts. Branly's filings tube came to light in 1892 in Great Britain when it was described by Dr. Dawson Turner at a meeting of the British Association in Edinburgh. The Scottish electrical engineer and astronomer George Forbes suggested that Branly's filings tube might be reacting in the presence of Hertzian waves, a type of air-borne electromagnetic radiation proven to exist by German physicist Heinrich Hertz (later called radio waves).

Unlike modern AM radio stations that transmit a continuous radio frequency, whose amplitude (power) is modulated by an audio signal, the first radio transmitters transmitted information by wireless telegraphy (radiotelegraphy), the transmitter was turned on and off (on-off keying) to produce different length pulses of unmodulated carrier wave signal, "dots" and "dashes", that spelled out text messages in Morse code. As a result, early radio receiving apparatus merely had to detect the presence or absence of the radio signal, not convert it to audio. The device that did this was called a detector. The coherer was the most successful of many detector devices that were tried in the early days of radio.

The operation of the coherer is based on the phenomenon of electrical contact resistance. Specifically as metal particles cohere (cling together), they conduct electricity much better after being subjected to radio frequency electricity. The radio signal from the antenna was applied directly across the coherer's electrodes. When the radio signal from a "dot" or "dash" came in, the coherer would become conductive. The coherer's electrodes were also attached to a DC circuit powered by a battery that created a "click" sound in earphones or a telegraph sounder, or a mark on a paper tape, to record the signal. Unfortunately, the reduction in the coherer's electrical resistance persisted after the radio signal was removed. This was a problem because the coherer had to be ready immediately to receive the next "dot" or "dash". Therefore, a decoherer mechanism was added to tap the coherer, mechanically disturbing the particles to reset it to the high resistance state.

Coherence of particles by radio waves is an obscure phenomenon that is not well understood even today. Recent experiments with particle coherers seem to have confirmed the hypothesis that the particles cohere by a micro-weld phenomenon caused by radio frequency electricity flowing across the small contact area between particles. The underlying principle of so-called "imperfect contact" coherers is also not well understood, but may involve a kind of tunneling of charge carriers across an imperfect junction between conductors.

Peter Vogel VE7AFV

Experimenting with over-the-air TV signals in a streaming world

Peter Vogel's experimentation with radio and satellite signals has extended to over the air television.

Perhaps Jim Erickson, better known to me as amateur radio operator VA7SHG, is indicative of the long-term issues and problems facing cable TV providers in Canada. He hasn't used cable television in almost two decades, and certainly doesn't envisage ever going back to having a subscription, at least not for himself.

Yet in his Chilliwack household there is a cable TV subscription, for his father who has lived with him in recent years. Jim, like many, is an inveterate streamer, but more recently an OTA (over the air) antenna user for TV.

His father only knows cable television in the standard form, a TV set with a remote control. But Jim has figured out a way to combine these different TV worlds – cable, OTA, and streaming – in his home using a combination of technologies.

Decades ago if you looked across any part of Metro Vancouver you saw a forest of TV antennas on tall masts. Today all but a handful remain, and those are falling apart.

Most people are unaware that many TV stations continue to broadcast over the air with signals that can be picked up by an antenna. Changing from analogue to digital technologies means antennas today are simpler and cheaper.

About a decade ago I experimented with OTA TV and shared my experience with colleagues and students. The most common question was, "Is this legal?"

We've become conditioned to think of TV as something we pay for through a cable subscription, and some broadcasters are completely fine with that, particularly those that also own cable distribution companies.

The bottom line is that OTA TV remains a rather niche product or service. Few actually use it, something reinforced by the numbers of OTA antennas one finds for sale on places such as Facebook Marketplace. OTA reception varies dramatically by region, even within cities. Here in Metro Vancouver we might be able to pull in a dozen or two channels, but in Los Angeles that might be as high as 160.

Recently I decided to experiment again with OTA TV, not with a view to eliminating my cable subscription, but rather to see what channels I could get and how far the reach might be. Off the bat I knew I wouldn't be able to pull in the likes of BBC World, CNN, and CTV Science Fiction – cable-only channels.

For my experiments I used two antennas that I was already using for radio and satellite experiments. I have two large screens that are usually hooked up to computers. I directed the antennas due south from my location and quickly discovered, after pressing auto program on the TV remotes, that I could pull in around 15 channels, all American.

Some were in full 1080i HD, but most were of lesser quality, some bordering on the unwatchable.

When I swung the antennas westward I finally saw some Canadian content – CBC, and CTV, although no Global. Each swing of the antenna required the auto program sequence to be run again.

Checking again late at night I was surprised to find several channels from the Seattle-Tacoma area, KING, KONG, and FOX.

Mr. Erickson currently gets 16 channels: Global TV, NewsMax2, six classic TV channels like MeTV, MeTV+, and Decades, a couple of religious channels, and a shopping channel. He is also on the edge of receiving PBS, NHK World, and a couple of other Washington channels. Since these are spotty at best, he is going to try a small pre-amp or signal booster to try to get those weaker channels.

Digital TV channels come in clusters. In my own case I pull in a group of seven sub-channels numbered 12.1 through 12.7, collectively known as KVOS. There is another cluster at 24, and a third at 28, for a total of 16 American channels during the daytime.

As for that cable TV subscription in Jim's home, he says it is strictly for his father. "My Dad lives with me on the main floor and has for the last seven years. He is the only reason we have cable in the house. Myself, I stream everything that I watch and haven't had cable since I moved to Chilliwack about 20 years ago. I remember how happy I was when I was able to watch the entire 2004 Olympics on CBC online with a computer hooked up to my TV. I knew I wouldn't need cable. But Dad likes Discovery Channel, History Channel, and Golf, so I know we won't be getting rid of cable any time soon, but still wanted to see what he thought of getting free TV."

Specialized software is important with Jim's approach to OTA TV. "Because I stream so much, I'm also very familiar with a piece of software called Plex. I've been running my own Plex Server at home for at least 10 years, if not longer. It manages all of my local media; whether that's DVDs that I own, music, pictures, it does it all for me. Then with the Plex app installed on my phone and tablet and TV, I'm able to stream all of my local media."

Recently he added a new device, an HDHomeRun using two tuners, which means two devices (TVs, tablets, phones) can watch live TV at the same time through their app. In the case of Plex, it allows someone to watch one channel while they record another channel.

"So now I've got my Dad set up with an AppleTV with the Plex app installed and he's able to watch his Global TV news in the morning and evening and then MeTV during the day."

Whether experiences with OTA TV such this, or indeed my own, have much impact on the cable TV business remains to be seen. In Canada, the broadcasters would love to shut down their transmitters. Some indeed applied for this to the regulator, but the CRTC denied them. They will surely try again.

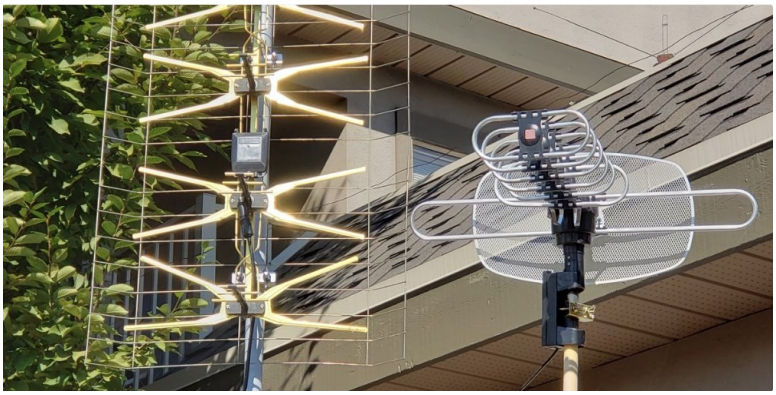
As for me, I will continue to experiment. I've come to enjoy the Tokyo channel NHK World and one of the KVOS sub-channels Story Television, but I'm not ready to hang up the cable TV remote. As a fellow amateur radio operator, I'm sure Jim and I will continue to discuss developments in the TV world over the air, via our amateur radios.

Follow me on Facebook (facebook.com/PeterVogelCA), or on Twitter (@PeterVogel)

pvogel@outlook.com

~ Peter VE7AFV

Peter is very active on Facebook and Twitter sharing his amateur radio SDR and satellite experiences from his home in Port Coquitlam, BC.



Page 12—News You Can't Lose

The Communicator now archived for eternity?

I was recently contacted by Andrew VA7EKA a recent SARC course graduate who was in contact with Kay Savetz K6KJN, who works at the Internet Archive. After hearing about a new project he's started, called the Digital Library of Amateur Radio & Communications, a project trying to amass as much possible content around amateur radio and communications as possible.

Andrew mentioned to him that our local club has a "super-awesome regular newsletter", as that's exactly one of the things they'd love to archive. Since The Communicator is Creative Commons licensed, Andrew assumed this would be appropriate content for the Internet Archive to add the Communicator back-issues to their records. Andrew also suggested that it's a great way to ensure The Communicator lives on "forever" as the Internet Archive is probably the ultimate place for long-term digital storage, considering their 26-year lifespan thus far and specific mission of longevity of data availability.

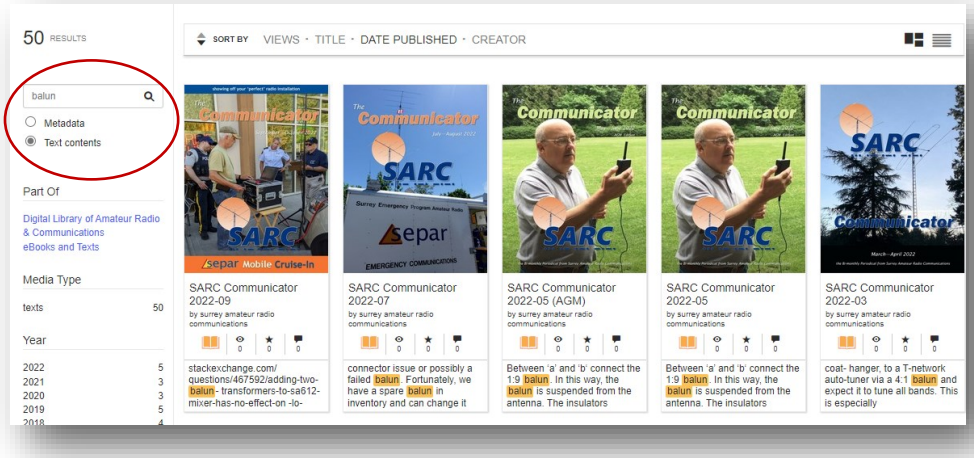
I forwarded the links to the years of Communicators that we have on file and the next day received word that they had been added. I checked the link at: https://archive.org/details/sarc-communicator?sin=TXT&sort=-date and found all our issues neatly organized and with full text search capability. Issues can be leafed through and read right on the site. As Editor, I have long tried to create an article index but that was a daunting task that seemed impossible to maintain.

Now, all you have to do is visit the site, click the 'text contents' button and type in your search term. That can be a subject, author, date or whatever other text. Click the magnifying glass and the search results pop up… Marvellous! In the example below I typed in 'balun' as my search term, the results are shown, and are a click away. It also shows in how many issues the term occurs by year and you can flip though the pages in your browser with the search term highlighted.

Besides all that, they have a pretty astonishing amount of content already, not only newsletters but magazines, catalogs and more, with the oldest piece of content dated from the year 1854 - an old map of European telegraph lines! Hopefully this will be an amazing resource for learning about all aspects of amateur radio, not only historical but current as well.

For those who wish to visit our own archive, below are the links to the various years we have on file, but alas… not indexed.

2022	2021	2020	2019	2018
2017	2016	2015	2014	2013
2012	2011	2010	2009 and earlier	



Page 13—News You Can Lose

The Lighter Side of Amateur Radio

Questions looking for answers and more

- If poison passes its expiration date, is it more poisonous or is it no longer poisonous?
- Which letter is silent in the word "Scent," the S or the C?
- Do twins ever realize that at least one of them is unplanned?
- Why is the letter W, in English, called double U? Shouldn't it be called double V?
- Maybe oxygen is slowly killing you and It just takes 75-100 years to fully work.
- Every time you clean something, you just make something else dirty.
- The word "swims" upside-down is still "swims"
- 100 years ago everyone owned a horse and only the rich had cars. Today everyone has cars and only the rich own horses.
- Why is it called a butterfly instead of a flutterby

Four great confusions still unresolved.

- At a movie theater, which arm rest is yours?
- If people evolve from monkeys, why are monkeys still around?
- Why is there a 'D' in fridge, but not in refrigerator?
- Who knew what time it was when the first clock was made?

Vagaries of English Language!

- Ever wonder why the word funeral starts with FUN?
- How come Lipstick doesn't do what it says?
- If money doesn't grow on trees, how come Banks have Branches?
- If a Vegetarian eats vegetables, what does a Humanitarian eat?
- How do you get off a non-stop Flight?
- Why are goods sent by ship called CARGO and those sent by truck SHIPMENT?
- Why do we put cups in the dishwasher and the dishes in the Cupboard?
- Why do doctors 'practice' medicine? Are they having practice at the cost of the patients?
- Why is it called 'Rush Hour' when traffic moves at its slowest then?
- How come Noses run and Feet smell?
- Why do they call it a TV 'set' when there is only one?
- What are you vacating when you go on a vacation?
- Did you know that if you replace "W" with "T" in "What, Where and When", you get the answer to each of them.

~ Portage County Amateur Radio Service, Inc. (PCARS) The RADIOGRAM (portcars.org)

Code Talkers

Fred Stam PE3FS

Radio amateurs communicate. You can say that again! You talk into a microphone and if all goes well, someone on the other side talks back; and everyone can listen in. We think that's success, but it's even better if you get a positive comment from a previously conducted QSO. Sometimes communication is only meant for a certain person or a group, then you go back to code or you look for something that cannot be eavesdropped on. In WWI and WWII, opponents also warned "Feind hört mit" and "The Enemy is Listening" with posters. Although it also referred to the civilians who should not be too loose-lipped.

Navajo Code

Erik PA2TX, the editor of the Dutch Amateur Radio Union (DARU) periodical, emailed me with a question. He had read a bit about the use of NAVAJO Indians during World War II to convey secret messages in their own language so they could not be understood by the enemy. Was there a story there? I replied that I would do some research and that I would look into it.

I thought: "Just search the internet, write it and you're done". But no, that turned out to be something else. The first article I found was indeed about Navajo Indians. The second was a list of languages used by the Allies and other warring countries. That was about all the Indian languages, that are still spoken today, up to the Basque dialect that is spoken in the north of Spain. For a glimpse of this history, a small summary:

- US Navajo WWII, used in Pacific, code talkers mysterious language for the Japanese.
- Canadian Sioux, WWII, Assiniboine language, code talkers.
- US Cherokee, WWI, 30th infantry division code talkers, during the 2nd battle of the Somme.
- US Choctaw, WWI, 8 men in the 36th infantry division spoke this language and were deployed during the Maas Argonne offensive as code talkers.
- US Comanche, WWI, 14 members of the tribe were used as code talkers during the invasion of Normandy.
- US Mohawk, were deployed in the Pacific.
- African Nubians, people who spoke the Nubian language (an ancient language spoken by Nubians living in

southern Egypt) were deployed by Egypt in 1973.

- US Tlingit, language of the Tlingit Indians (an unwritten language that is only spoken) from Northern Alaska and Western Canada. Unknown where they were deployed. At the moment, only 140 people speak this language
- UK Welsh, a system based on Welsh was used by the English armed forces in WWII, however, not on a large scale. In the Yugoslav war, it was used for non-vital messages.
- China Wenzhou, People from this region (Wenzhou) were used in the Chinese Vietnamese War in 1979.
- Basque has not been used as often because it turned out to be a fairly well-known language. Although they did have plans to use it. Incidentally, a fairly large community in the Pacific, in China and in the Philippines used the language. And in the army there were too few who spoke the language. So that was a risk. The language has been used in certain actions, but not nearly as often as Navajo.

But let's limit ourselves to the best known of all code talkers, the Navajo Indians.

In 1942, 29 Navajo Indians joined the U.S. Marines and were invited to develop an unbreakable code that would be used in the Pacific. Those were the first Navajo code talkers. A total of 400 Navajo code talkers were deployed during WWII.

Codebreakers

The Japanese had broken every code the US used in the Pacific. As a result, there was a great need for code that could not be deciphered. Philip Johnston, an official who had worked on a Navajo reservation for a while came up with the idea of using the Navajo language. Navajo is a language not written but only spoken and was understood only by Navajo people. This could be the basis for a very effective code. He presented the idea and a group was organized under the greatest secrecy to recruit people. In February 1942 Vogel and Jones - two men from the aforementioned group - witnessed an experiment with Navajo men.

Navajo men gave Navajo words to military terms. Navajo and Navy personnel sent out messages that matched the style and content of the military messages that would be used in battle. The standard code used at the time was the Shacklecode (a number-based code) that encrypted language into code via a coding machine and transmitted it. Then, with a similar machine, the receiving end decrypted the message to readable language.

It took an hour to send and receive the test messages using the Shacklecode. When the same messages were sent and received in Navajo, with the Navajo men acting as human cipher machines, it took only forty seconds for the information to be sent accurately. The experiment was a success and Vogel agreed to start a pilot.

A	Wol-la-chee	Ant
B	Shush	Bear
C	Mosai	Cat
D	Be	Deer
E	Dzeh	Elk
F	Ma-e	Fox
G	Klizzie	Goat
H	Lin	Horse
I	Tkin	Ice
J	Tkele-cho-gi	Jackass
K	Klizzie-yazzie	Kid
L	Dibeh-yazzie	Lamb
M	Na-as-tso-si	Mouse
N	Nesh-chee	Nut
O	Ne-ahs-jah	Owl
P	Bi-sodih	Pig
Q	Ca-yeilth	Quiver
R	Gah	Rabbit
S	Dibeh	Sheep
T	Than-zie	Turkey
U	No-da-ih	Ute
V	A-keh-di-glini	Victor
W	Gloe-ih	Weasel
X	Al-an-as-dzoh	Cross
Y	Tsah-as-zih	Yucca
Z	Besh-do-gliz	Zinc

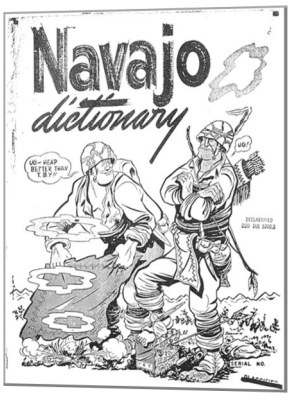
Right are the words that were commonly used; but before the implementation of the NATO alphabet

Due to the secrecy, it was decided to limit the pilot program to 29 Navajo men. From July 1942 to September 1942, 29 Navajo men from Platoon 382 helped invent and develop the code.

A unique code

The Navajo code differed from other Native American codes used in the past. The Navajo oppose polluting their language with English words. The Navajo instead invented their own words for inventions such as telephone and radio. A person who is not Navajo finds it difficult to hear Navajo words properly, making it virtually impossible to then reproduce the words, and almost impossible to pronounce even one word Navajo. There are sounds in that language that are hardly used anywhere else. Moreover, as Navajo Code Talker Sam Tso said, "Our Navajo language has no alphabet. We can't write down our language and we can't read it. When developing the code, they used the English alphabet. When I looked at it, I discovered that they distributed the ABC to the animals that live in the water and move on the water, that fly in the air, and the animals that live on land."

Two types of code



There were two types of Navajo code developed by the original Navajo Code Talkers. The first was the Type 1 code, which consisted of 26 Navajo terms that stood for individual English letters that could be used to spell a word.

For example, the Navajo word for "ant," in Navajo wo-la-chee, was used to represent the letter "A" of Ant, in English. Type 2 Navajo Code contained words that could be translated from English into Navajo, and it contained a dictionary. For example, in the Type 2 Navajo code, there was no existing word for "submarine," so the Navajo code speakers used BESH-LO, which translates to "iron fish."

The soldiers of the Choctaw and Comanche used their own language as code. They were used during the First World War to deceive the Germans. The Germans did have a suspicion and they later discovered which languages had been used in the war: They sent so-called tourists, scholars and anthropologists to the United States to learn the languages of various Native American tribes. However, the Navajos were not visited by these German spies.

Navajo Code contained 642 words. In comparison, the Comanche Code Talkers, also from that war, had only 250 words, and the primitive Choctaw speech experiment had only 20 words.

YouTube link https://youtu.be/VzkEsMYxhFM has more on the CodeTalkers

The Japanese attempt to crack the code

A Japanese interrogator questioned an imprisoned Navajo POW, Joe Kieyoomia, and came to the conclusion that the code must have something to do with the Navajo language. Despite being tortured, he never once revealed the secrets of the Navajo Code. The Japanese head of intelligence stated that he could decipher the first codes used by the U.S. military, but he had never been able to crack the Navajo code.

The Navajo code was also the basis for some important successes on the battlefields of the Pacific. In the battle of Iwo Jima in February 1945, Major Howard Connor of the 5th Marine Division said, "If it hadn't been for the Navajos, the Marines would never have taken Iwo Jima." Howard Conner had six Navajo Code Talkers with him, and during the first two days of the battle of Iwo Jima, they sent more than 800 messages, all flawless.

One of the last reports of World War II was the observations of American scientists of the August 9, 1945, atomic bombing of Nagasaki, and that message was returned in the Navajo Code. The intricacies of the Navajo code made it perfect for military use.

Unfortunately, it wasn't until decades later that the Navajos received the honour, awards and publicity due to them. During their operations in the Pacific, they were very important. A film called 'The Windtalkers' was made in 2002 based on their stories. Incidentally, a film with only moderate success. A salient detail is that because English was the official language, Indians on reservations were forbidden to use their native language. Later, the U.S. was able to use the language again during warfare.

~ *Fred PE3FS*

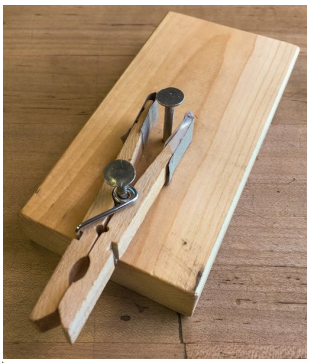
With thanks to Fred for permission to translate his article, which was originally published in DARU Magazine #30, September 2022

In 2010, famous Navajo Ute sculptor Oreland Joe designed and erected the Navajo Code Talker Monument near Window Rock, Arizona.

Solder Splatter

John Schouten VE7TI

Home built CW keys

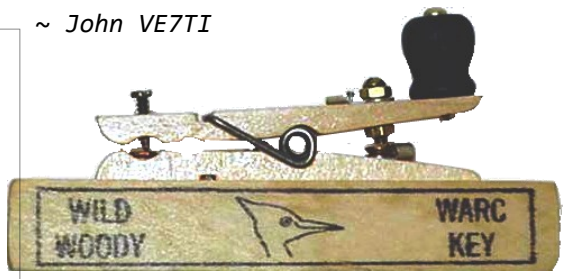


CW keys can be ridiculously expensive. Sure, I get that for the CW aficionado keying at high speed, a good key is a necessary accessory but, for the beginner or student practising Morse, or sending a few calls, there should be a good, accurate key available.

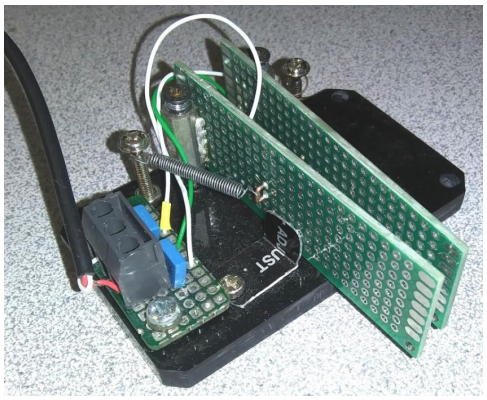
Earlier this year we invited our local readers to submit photos of some homemade keys with the intent to show that they can be made for a reasonable price and with a few basic skills. There was only one local entry. Disappointing for sure, but we did receive several foreign submissions, some of which are pictured here.

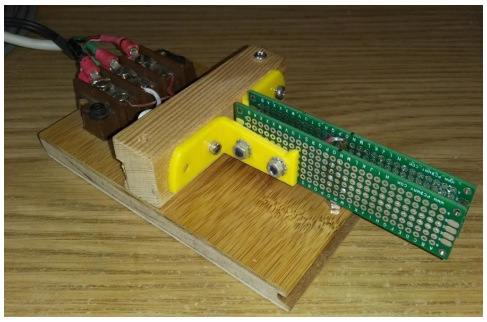
I built two myself, purely for my own enjoyment and, as a possible future project for our CW class students.

~ John VE7TI



Here is the homemade key submitted locally





I just saw the note about homemade keys in your newsletter. I made this for SOTA. Springs are from pens. Bushing bearings are brass PCB spacers drilled out to barely allow the flathead screws to go through. Additional springs press the bushings to the base, reducing slop. Contacts are taken from a mangled relay and soldered to the PCBs. Base is acrylic with holes in the corners for tying it down with string or cord.

Below is its predecessor. It also uses contacts taken from a relay. I didn't like the increase in force required on its levers as they close. Therefore, I used springs and bearings on the next version. The dx (in F=-kx, the spring equation) is a small fraction of x, the total spring extension, enabling F to change very little between the open and closed position. This has a better feel to my fingers.

Cheers,

~ Halden Field VE7UTS

From the UK... make a Morse key

Hello, Thank you for the latest Communicator mag. Very interesting reading,

As I am not a paid up member, nor am I a resident of Canada, I am not entitled to take part in the make a morse key challenge, but thought you might like to see a couple that I have made with minimum engineering experience, and minimum workshop machinery or tools.

A magnetic straight key made from odds and ends!
https://nemosphotography.blogspot.com/2020/10/a-magnetic-straight-key-project.html

An "illuminated" morse key
https://nemosphotography.blogspot.com/2019/05/illuminated-morse-key.html

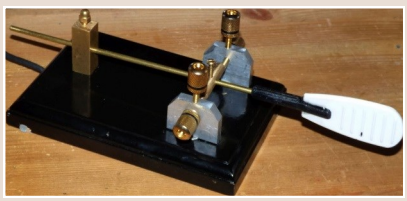
An Elegant Torsion Bar single paddle key
https://nemosphotography.blogspot.com/2018/03/an-elegant-torsion-bar-single-paddle-key.html

In the archives, on the left of the main text area, there are stories about all of my keys, and some really interesting histories.

Thanks again,

Gerry (G3MS on CWCOM
https://morsepower.blogspot.com/

Portsmouth, England



The 'Depot' cootie key

Michael A. Maynard K4ICY

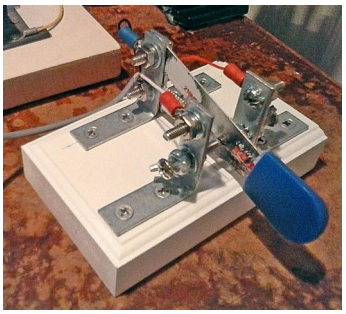
Michael describes a great project to build your own Cootie key on his website. It uses off the shelf parts readily available at your local hardware store.

The full project is described step-by-step at http://www.k4icy.com/weekend_radio_depot_cootie.html

"Be The Complete Ham," no one can rightly call themselves a "real" ham until they've attempted to build some piece of their own equipment.

As the great homebrewing advocate Frank Harris, KOIYE, once put it: "Be The Complete Ham," no one can rightly call themselves a "real" ham until they've attempted to build some piece of their own equipment. The very act of homebrewing some station accessory or piece of radio gear divides the sheep from the goats - or the Amateur from the appliance user. Sure, not all hams are so technically inclined, but this is a teaching hobby and if the hams of the early part of last century could be compelled to understand the inner workings of their radios and craft just to be granted a class A or B license, then the hams of today can certainly endeavor to go that one extra step.

The "Cootie" or side-swiper key, as mentioned in my associated article was one of first easy-to-build "alternative" key solutions for the telegraph operator of the late 19th century and later for the experimenting ham of the radio age. The side-to-side motion was easier on the wrist and an operator could actually send faster with less work. The literal backbone of this simple key relies on a springy piece of steel to act as the actuator arm, pivot bearings and retracting springs all in one. All one had to do was affix the other end of the arm and provide some adjustable contacts that would be available on both the left and right. Many a new ham of not-so-prosperous times found the "Cootie" to be an economic necessity for enjoying their new Novice licenses. As the early part of the 20th century rolled on, hams found themselves converting surplus or broken semi-automatic "Bug" keys to single-lever paddles. Later on, with the advent of the transistor age, when electronic keying became an affordable reality, a few enterprising key manufacturers produced dedicated solid arm models which promised incredible speeds and improved sending accuracy. A few particular models are still in production today and are considered popular and the key of choice for speed aficionados.



Depot Cootie Key

Can I build one for myself so easily?" you say. Yes, and I'll show you an example that took me only half an hour to build and it works great! There's a beauty in constructing something with simple parts. First of all, we need to do a little "up-cycling" by re-using an

old part that would have normally gone to the landfill. Go take a look at your hacksaw, in particular, the type used for cutting light metal or wood and has a thin blade that is at least a foot long (30cm) and 1/2" (13mm) wide - which is the part we'll need. If you don't have one lying around, that's okay, a pack of replacement blades are not that expensive. You'll need to do a little prep to the blade once you have your other parts, so keep these old and worn blades handy for future "gift" keys.

Hack Saw and Corner Braces

Now I can't endorse one hardware store over another here, but I'm sure that you'll find everything you'll need at your local Lowe's®, Ace Hardware®, B&Q®, Bunnings®, Home Depot® or whatever hardware store you frequent, so there'll be no need to order anything, and the tools will be minimal. For my build, I went to The Home Depot® [Yes, I named this key the "Depot Cootie," but if anyone asks, maybe I was re-envisioning the days of railroading telegraphy past.] Anyways, you can expect to find all the parts on the list to cost you at least $10 USD and not much more. If you have a piece of wood lying around that you can cut to form the base of the key, then you're already ahead, but I happened to find this piece of pre-fab molding in the trim section for only 84 cents - and it already had an attractive chamfer on it!

Aside from the used 1/2" (13mm) wide hacksaw blade and a good wooden base, the right angle brackets are the key to this assembly. I used 1-1/2" (38mm) corner braces I got in a pack of four for only a few bucks.

Once affixed to the base, the bottom holes on the vertical section are used to mount the blade and the contacts while the top holes serve to connect the wires. You'll see that the list of fasteners is a little extensive including two kinds of lock washers and pan-head machine screws, but nothing here is critical and I leave it up to you to figure out a solution that works best for you. The one part that may be important is to use all #8 faster sizes as well discuss later. Also, everything should be stainless steel if you can get it so that your key will not suffer from poor electrical connections later on due to surface oxidation.

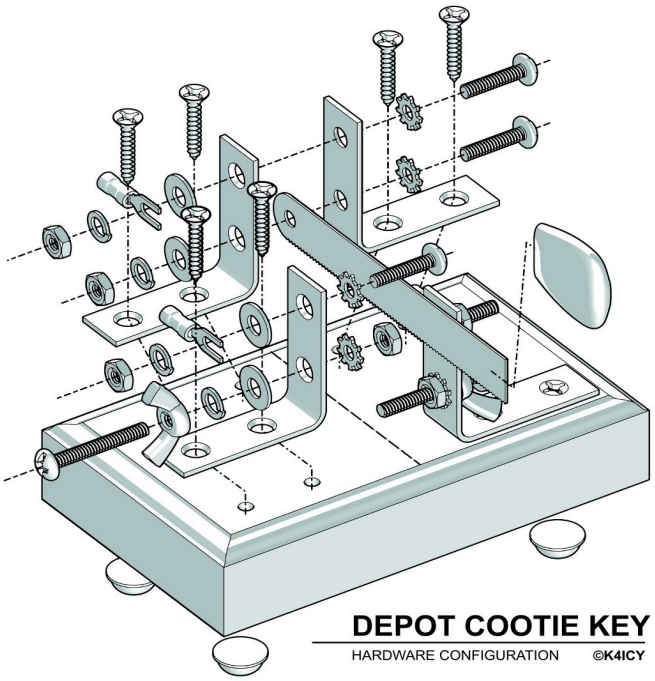
Hardware

Steel ½" (13mm) Hacksaw Blade, Pre-Cut 4-1/2" x 2-3/4" x 1" (12cm x 7cm x 2.5cm) (not critical) Fiberboard Trim Block, (4) 1-1/2" (1/2" wide) (38mm) Galvanized Corner Braces (Brass may contain a non-conductive coating), (3) #8-32 x 5/8" Pan (or round) Head Machine Screws, (2) #8-32 x 1" Pan (or round) Head Machine Screws, (6) #8-32 Machine Screw Nuts, (6) #8 Ext. Tooth (Star) Lock Washers, (6) #8 Flat Washers, (6) #8 Med. Split Lock Washers, (2) #8-32 Wing Nuts, [Use whatever 4mm+ metric sizes that will suit,] (4) Small Adhesive-Back Rubber Feet, Finger Piece taken from a Chip-Clip – or use anything that can be glued on.

Tools

Large Tin Snips (Metal Shears), Drill (for pilot holes in wood), Screwdrivers, Socket Drivers, Metal File, (opt.) J.B. Weld.

~ Michael K4ICY



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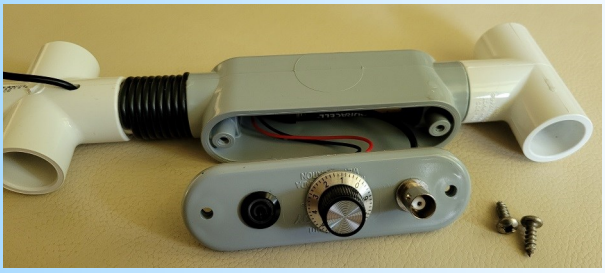
Solder Splatter

John Schouten VE7TI

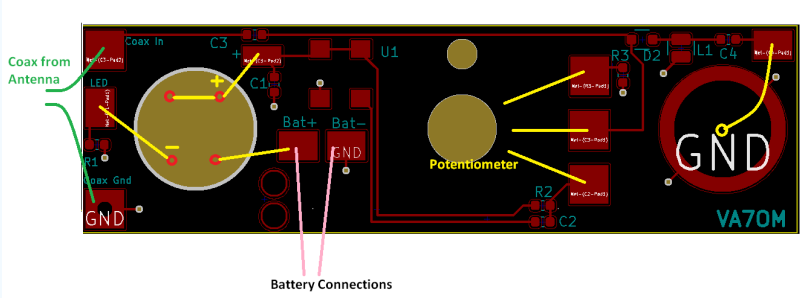
A 2m tape measure fox Yagi with attenuator



Surrey Amateur Radio Communications has become very involved with Amateur Radio Direction Finding (ARDF) over the years. We host an annual 'Fox Hunt' and other training events through the year, interrupted for a time by the recent COVID epidemic. Two individuals have been key players in generating this interest, Les Tocko VA7OM and Amel Krdzalic VA7KBA. Both Les and Amel have world class experience in the radio sport so we are indeed fortunate to have them with us locally.

A few years ago Les designed a new 80m fox receiver that has become very popular locally and has dominated our ARDF events. With an eye on re-introducing 2m Fox Hunts, Les has now designed a 2m offset attenuator that integrates very nicely with the 2m measuring tape Yagi antenna that has been around for several years. The advantage of a measuring tape antenna of course being its flexibility in the bush.

The offset attenuator moves the fox frequency up 4 MHz or 4 MHz down. Our fox frequencies are 146.595 MHz and the beacon frequency 146.415 MHz. So to listen for foxes you tune your receiver to 150.595 MHz (or 142.595 MHz, your



choice). To listen to the beacon, you tune your radio to 150.415 MHz or 142.415 MHz. It is important to turn your squelch off. When listening to the foxes or the beacon adjust attenuation so that you start hearing the static. As you get closer to a fox, add more attenuation. You will have a nice signal pointing to a fox and signal with static, or static only when pointing away from the fox.

With the help of John Brodie VA7XB a club project was launched to offer the kit and a construction workshop to SARC members. That workshop took place on October 1st and 8th at our Operations & Training Centre. Les brought out the supplies required and distributed the components. The board was beautifully etched and looked commercial quality. He had pre-soldered the surface mount parts, so what remained were the battery box, switch, attenuator pot and BNC mount plus some miscellaneous wiring.

The whole board and battery assembly is contained within an electrical conduit box, which is then glued into the boom of the 2m Yagi.

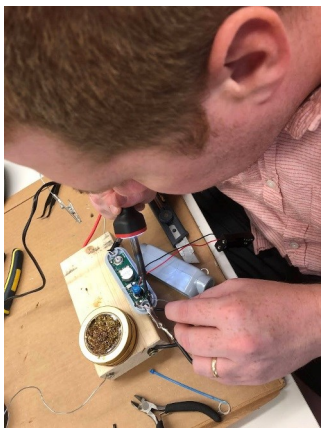
Shown are some photos of the attenuator and the Yagi build. Rather than repeat the Yagi instructions, which we have offered in the Communicator previously, here are links to the original project, and its step-by-step assembly:

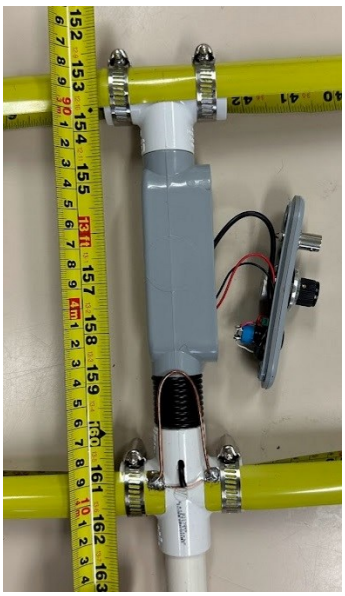
https://www.youtube.com/watch?v=BmHoQrDfw-0&t=118s&ab_channel=KB9VBRAntennas

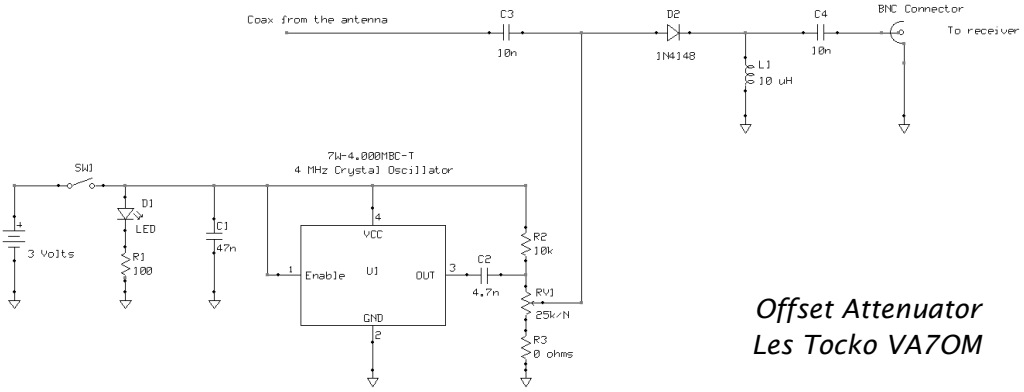
https://www.youtube.com/watch?v=ktoiyKoo36A&ab_channel=3OldTechDudes

This was a limited run, however there may be future availability. Thanks Les, for another great project! We hope to be able to test them out in the field very soon.

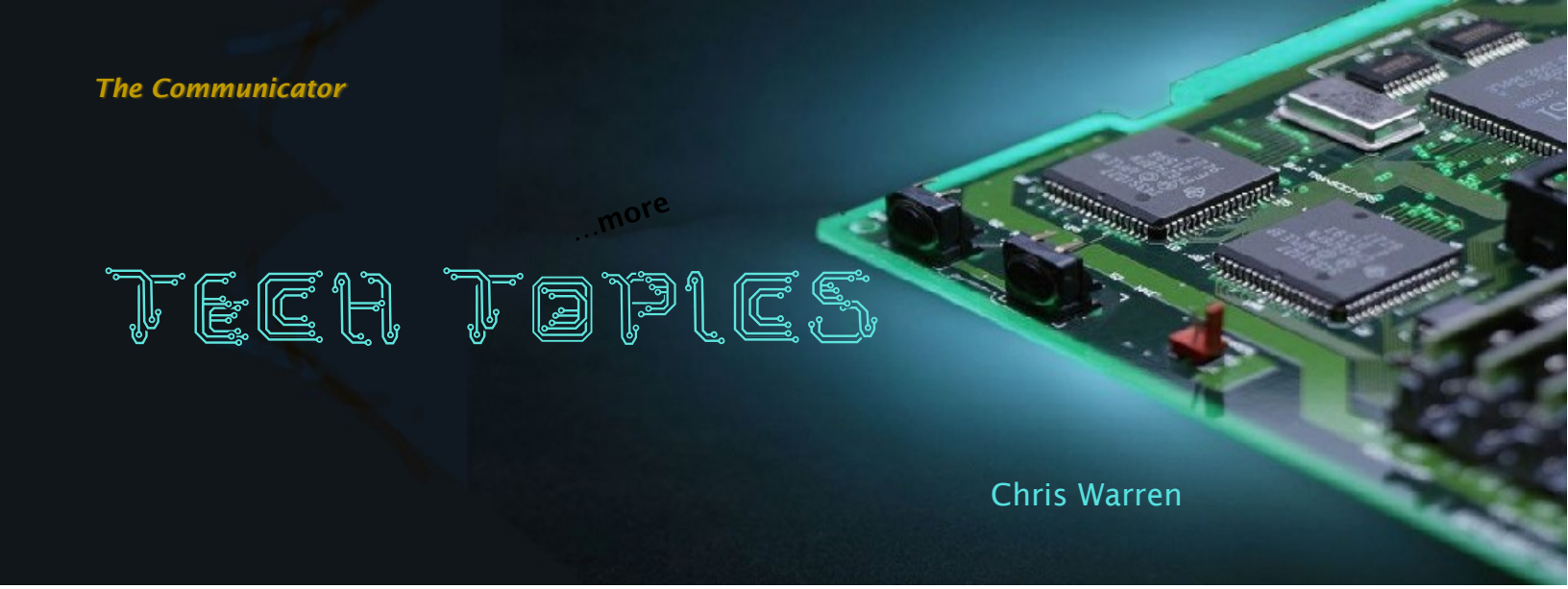
~ John VE7TI







Offset Attenuator
Les Tocko VA7OM



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TECH TOPICS

Chris Warren

Understanding wire & conductors

Moving electrons around

Wire and electrical conductors are so fundamental that we use them without giving much thought to their importance. Conductors, or wire, are to electricity what pipes are to water. Without them, absolutely nothing happens. This time around we're going to examine wire & conductors, their behavior, and how you can apply this knowledge to improving your radio operations.

What is an electrical conductor?

For a material to be a conductor, it has to be able to pass electrons easily. What this means on an atomic level is electrons in the outer orbit of an atom, called valence electrons, are easily broken free by an electric charge. The energized electrons can then "move" to neighboring atom. When this process is repeated over and over, useful electrical current is created.

There is no formal criteria a material must meet in order to be considered a conductor. Conductors are usually classified based on their physical properties and for practical reasons. For example, silver is more conductive than copper. However, since silver is much more expensive than copper, copper is commonly used to make wire.

Another example is aluminum. Aluminum is less conductive than copper, but it's also much lighter, less expensive, and less prone to corrosion. In weather-exposed applications where weight and density are critical, such as an antenna, aluminum is often a better choice.

By contrast, an insulator has very strongly bonded valence electrons; it does not want to let them go. No electron movement= no electricity flow. Every insulator will eventually fail if you shove enough voltage through it. The point at which an insulator fails is called breakdown voltage. Insulation on wire commonly used by radio amateurs has a breakdown voltage in the thousands of volts. Since hams seldom if ever see voltages that high, it's not a concern.

The main point to remember is a material's conductive properties are not the only important factor. If having the best conductor was the sole priority then everything would be wired with silver. At this writing silver is about $18.00 USD/oz (28g), copper is $0.23/oz, and aluminum is less than $0.07/oz. so it's obvious why everyone uses copper and aluminum!

In order of most conductive to least conductive:

1. Silver
2. Copper
3. Gold
4. Aluminum
5. Zinc
6. Nickel
7. Brass
8. Bronze
9. Iron
10. Platinum
11. Carbon Steel
12. Lead
13. Stainless Steel

Table of the conductive order of metals

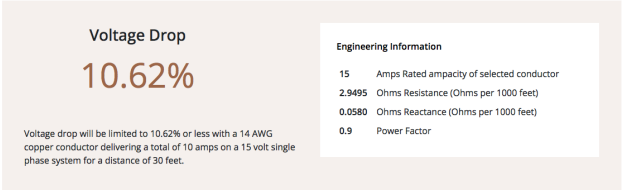
This list of electrical conductivity includes alloys as well as pure elements. Because the size and shape of a substance affects its conductivity, the list assumes all samples are the same size.

Considerations for copper wire

What you can expect from copper depends on several factors. The size (gauge) of the wire, length, and type of current (AC or DC) are the main drivers of how copper wire will perform. To a lesser extent, temperature also has an effect.

As conductive as copper is, amateurs nonetheless need to take its resistance into consideration when planning projects. Particularly when used with DC current, copper wire can introduce substantial power losses.

Example: You have a 12 volt solar panel system that produces 10 amps. The wire run will be 30 feet. Since you have a lot of 14 gauge wire leftover from a home brew antenna, you're going to use that on this new project. Will it work? What can you expect? Here are the results from an online calculator:



We used 15 volts for this calculation because remember: A solar panel will always produce more voltage than its published rating. It looks like you're going to drop 10.63% or 1.59 volts in the run from the solar panel. That's before any other losses. Engineers consider a loss of 3% or less as acceptable. A 1.59 volt drop doesn't sound like much, but if we apply the lessons from last month's article about Ohm's Law, that comes out a power loss of just under 16 watts.

As we've discussed many times before on Off Grid Ham, running off grid power is a delicate dance of tradeoffs. You're always going to give in one area to gain in another. Is using that leftover wire worth throwing away over 10% of your energy? That's for each individual to decide. If it were me, I'd be looking for a better option. "Better options" include: shortening the wire length, using a larger gauge wire, or boosting the voltage.

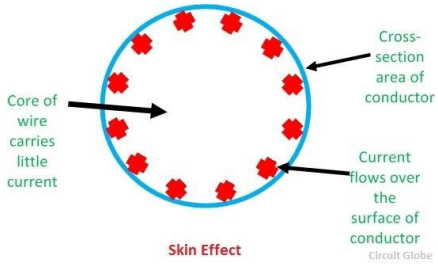
There are dozens of on line calculators that will help you figure out how any given type of wire will perform.

Solid vs. stranded wire

Stranded and solid wire are not the same thing and do not perform the same way. A stranded wire may have the same total diameter of an identical gauge solid wire, but some of that cross-sectional space is air. This is why stranded wire has less current capacity than a solid wire of the same size. Also, because of those air gaps, stranded wire is more prone to corrosion. On the plus side, stranded wire is flexible and easy to push around tight turns and is a good pick for repetitive bending environments or coiling for transport.

You may have heard discussions over whether solid or stranded wire is "better". It's an empty argument. Which is better depends on the application, personal preferences, and availability. My wire antennas all use stranded wire because it's easier to work with and has more flexibility in the strong storms common in my area. For home AC wiring. local building codes often have different rules for the different types of wire, or require one type or the other in certain situations. Generally, home AC wiring is solid.

Skin effect



Skin effect applies only to AC current and is the phenomenon where the electron flow on the outer circumference of the wire is greater than it is in the center. Skin effect does not apply to DC. In DC current, the electron flow will be even across the entire diameter of the wire.

Off grid amateurs should not be concerned about skin effect. It can come into play when dealing with antenna feed lines and RF; for the purpose of electrical power for your equipment, simply know what it is to impress your friends and don't worry about how it may effect your system.

Wire insulation: It matters!

So far we've talked a lot about wire and conductors, but the insulation around the conductor matters too. The wrong type of insulation can mean the difference between an application that runs reliably for years and one that fails after a few months or even weeks.

Polytetrafluoroethylene (PTFE) and Teflon are from the same fluoropolymer family. They have excellent resistance to oxidation and breaking down from UV radiation, can withstand both high and low temperatures, and can be directly buried. Either one would be a great choice. If it matters to you, Teflon is slightly more resistant to nuclear radiation than PTFE.

The problem with selecting wire insulation is that information is often lacking. Consumer packaging and websites often have vague subjective terms like "UV resistant" and "suitable for outdoors" without specifying the exact chemical makeup of the insulation. It would be worth your while to do some research and not just grab whatever is on sale on line or the local big box store.

Thermoplastic high heat nylon wire I

f you are an electrician or into home repairs/upgrades, you've probably heard of thermoplastic high heat nylon (THHN) wire.

It will withstand temperatures up to 194F/90C, is oil resistant, and meets NFPA-70 safety standards. THHN cannot be directly buried or used to convey high current in unprotected outdoor environments. It includes an outer nylon sheath to protect it from abrasion.

THHN is ok to use for outdoor antennas as those applications do not have the same safety concerns as AC or DC power. However, if used for an outdoor antenna the outer nylon sheath will eventually break down and peel off. For antennas this isn't really a big deal but THHN should not be exposed if used to convey AC or DC power.

THHN is by far the most common type of wire used in North America for home and commercial electrical systems. You can buy it pretty much anywhere in many gauges, stranded and solid. If you have to choose only one type of wire, THHN would be the one. It is a must-have stock item for preppers/survivalists.

Don't overthink this!

We've gone over the physical and electrical properties of various conductors. While it's important to know how conductors work, it's also important not to let yourself get lost in a technical maze. Operators with short wire runs (such as a portable setup) don't need to sweat the details the way a home-based operator with long wire runs might. Basically, the more power you have and/or the longer your wire runs are, the more the issues we've discussed matter. If your off grid power system is not working as well as you think it should, take a critical look at the wire, connections, and conductors. The solution to your problem may not be as complex as it seems.

~ Chris Warren
Off-grid Ham

Check out Chris' blog site at https://offgridham.com/ for interesting articles about keeping amateur radio on when the grid is gone.

Daniel Romila VE7LCG

Daniel's Workbench

Antenna preamplifier with two BF998 MOS-FET

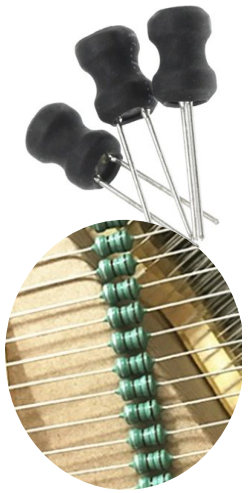
I just became the owner of a new SDR receiver, a clone of RSP1. After adding protection diodes at its input, I tested it and – like most SDR wide band receivers – its sensitivity made it of very little use to me, especially in the shortwave range. *(The year 2022 saw a multitude of RSP1 Chinese clones, which I reviewed in another article and I had to update in May 2022 due to an interesting new version.)*

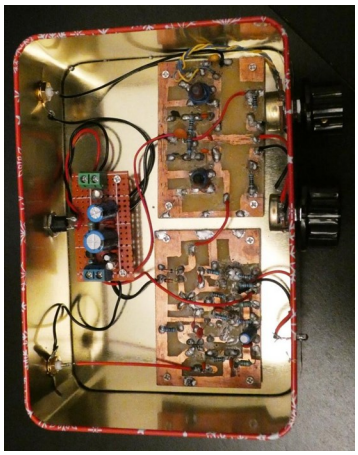
The solution was to build an antenna preamplifier in which to have some front-end variable filters. At the end of this article I will also present a wide band version, which is in fact the version with which I started, I optimized it on the computer and made measurements on my oscilloscope. The final schematics for 14 MHz – 30 MHz I built and put in a metallic case is on the next page.

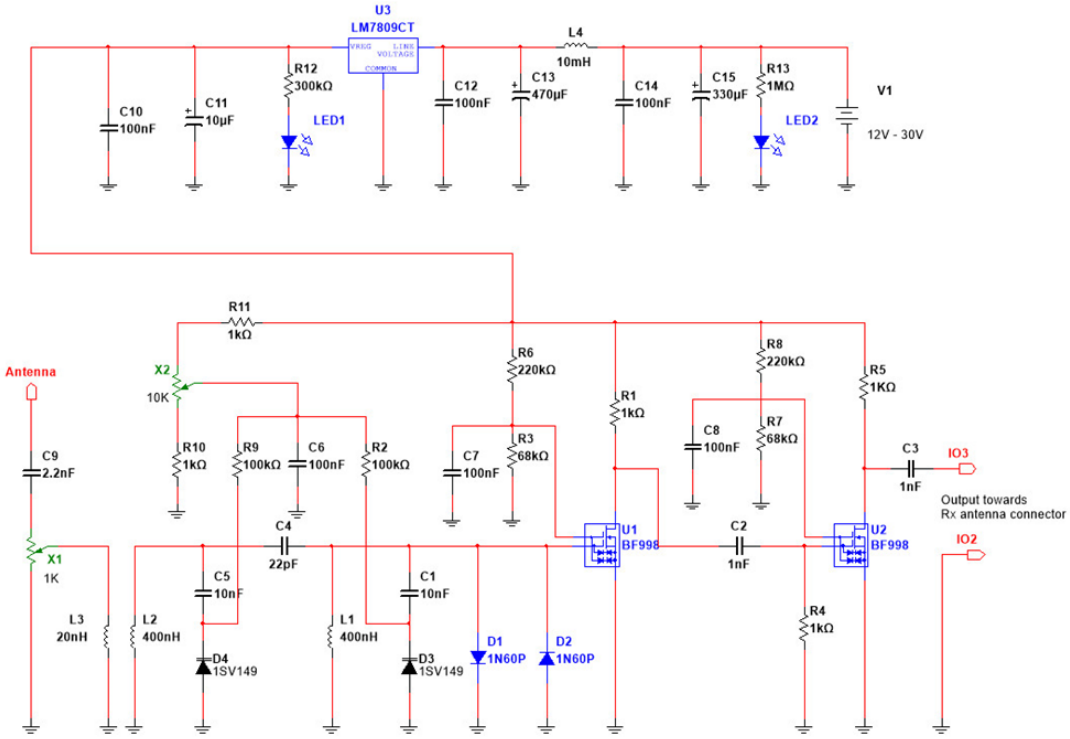
As you see, I made a separate part for power supplying the preamplifier which generates 9 Volts, stabilized. This is because I decided to use transistors BF998 which have a maximum source-drain voltage of 12 Volts. There is no need to force them to the limit, so a 9 Volt power supply for the whole preamplifier is a good value for safe performance.

I have plenty of LEDs, so I put them everywhere for visual indication and my LEDs function with very small current, microamps. The resistors put in series with the LEDs have high values and there is no mistake there. The power supplied voltage is strongly filtrated with whatever capacitors I found rescued from previous projects. I even used an already made 10 mH inductor. Molded inductors can be found on many websites, like aliexpress.com.

After the stabilizer integrated circuit LM7809, I put a smaller value electrolytic capacitor, just 10 microF, not to force an initial high current through the stabilizer if the electrolytic capacitor is "empty". My build used a metallic case from Dollar Stores, in which it was easy to drill for connectors, LED (yeah, a third one on the case – I have thousands of them), buttons and screws.







There are 3 modules inside:

- The antenna variable filter, with two sections
- The amplifier with two stages, each one based on BF998
- The stabilized power supply

The stabilized power supply module I made allows this project to be supplied even from 12 Volt power bricks. Without the aggressive inductor-capacitor filtration from the stabilizer module there is a strong noise coming from such brick switching power supplies. I tried several bricks. The 12 Volts generated by those power bricks did not allow me to add a protection diode because I would have lost another 0.65 Volts and the integrated stabilizer circuit would not have had the necessary around 3 Volt difference between input and output for correct functioning. My particular stabilizer gives 9.19 Volt instead of 9 Volts.

The RF 14 MHz – 28 MHz antenna signal filtering part is based on inductors made from 5 turns of telephone wire on a 4 mm plastic support with ferromagnetic core. The connection towards the potentiometer/antenna is made with 1 turn of the same telephone wire. The 1 KOhm linear potentiometer gives a very comfortable adjustment of the input signal.

I used the MOS-FET dual gate BF998. It is not compatible with BF981, BF961 or 40673.

First of all, it is a Surface Mounted Device (SMD). It has a limit of 12 V between drain and source. The BF998R version has the drain and the source terminals in switched position versus BF998. It likes to work with the source connected directly at the

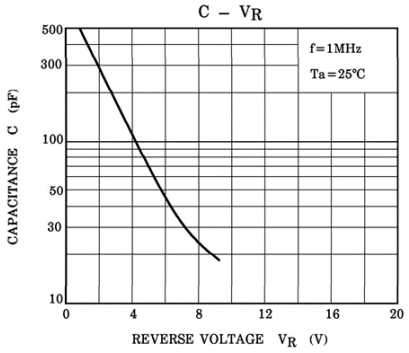
ground. In my particular schematic the maximum amplification is obtained when G2 is connected at 2.1 V to 2.25 V, not at 4 V.

I used the schematic below for simulation in Multisim.

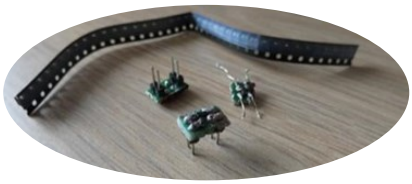
I used a lot of protection diodes because the same schematic I assembled on my breadboard, with a signal coming from my signal generator incorporated in the digital oscilloscope, has millivolts output, not microvolts. So, you can omit the last two groups of protection diodes and keep just the first two connected in front of the first MOS-FET. The BF998 have incorporated into them diode protections on both gates anyhow. If you solder BF998 and then think they no longer work, wait several minutes for them to cool down, and they will work again. It happened to me several times. There are big differences between BF998s from the same SMD tape. Differences in amplification and in input/output capacitance.

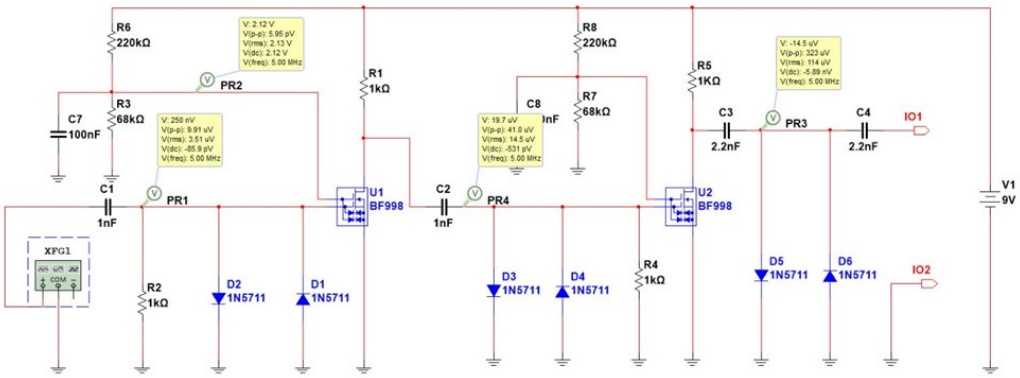
The key to the stability of having two MOS-FET one after another is the 1 KOhm resistor in the drain and also the 1 KOhm resistor in the gate of the second MOSFET. This kills any tendency for self-oscillation while keeping a reasonable amplification. After the amplifier board was in the metal box, I tried to replace the 1 KOhm drain resistor with a 1 mH inductor, or with a 1 mH inductor in series with a 1 KOhm resistor. The presence of the inductor added instability so it is better to keep the schematic simple, with 1 KOhm resistor between the drain and the plus rail. Separating the power supply stages with 1 mH inductors followed by decoupling capacitors did not change anything, because the preamplifier was already stable.

In the Multisim simulation I got 100 X amplification (20 dB) for the wideband amplifier at 5 MHz. I obtained the same result on the breadboard, with millivolts signal, not with microvolts as in the real-life situation. The amplification declines with the frequency due to the MOSFET device itself, not because of my particular design. The final project, in the box, verified with SDR Uno software for RSP1, at 28.197 MHz where I have a CW beacon situated 14 Km from my location, increased the signal from -95 dBm to -70 dBm (from 4 microvolt to 71 microvolt) more than 15 times. The results might vary within small limits due to particular BF998s, which I already told you vary greatly even if the measured BF998s are from the same SMD tape. My purpose was to obtain an amplification more than 10 times in the 10 meters band (low signal), so my project is a success for me. It moves the sensitivity of a receiver from a microvolts value into an under one microvolt value. BF998 allowed me to do things where a BF981 or BF961 would



The tuning is assured by two varicap diodes, 1SV149. They have a typical capacitance of 500 pF at 1 V and 25 pF at 8 V.





have self-oscillated. The noise figure for BF998 is good, 0.6 dB at 200 MHz and 1.0 dB at 800 MHz. BF998 does require mounting it on a support board and brings all kind of complications of an SMD device in comparison with through the hole devices. BF981 has 0.7 dB noise at 200 MHz. The old 40673 has 3.5 dB noise at 200 MHz.

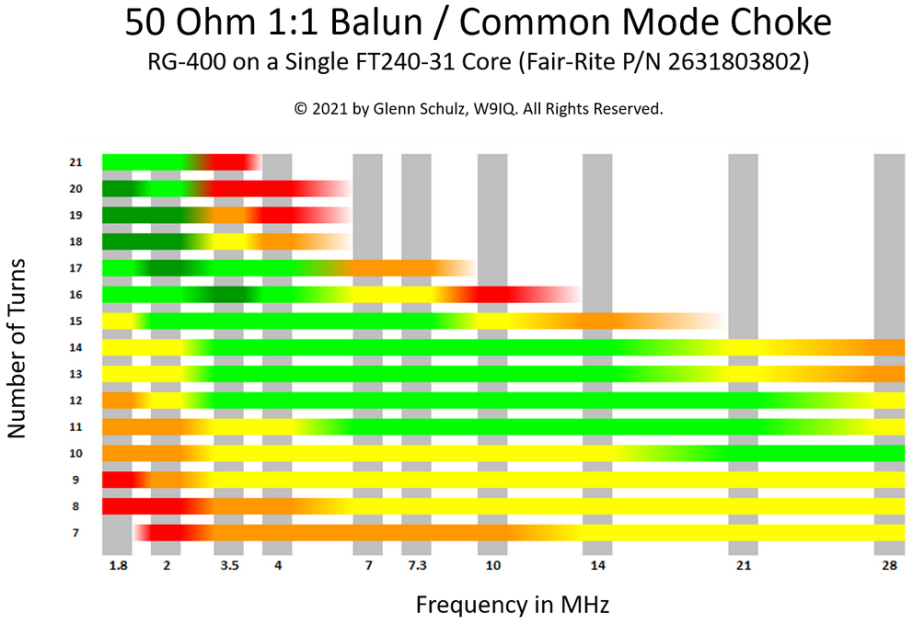
I repeat at the end of this article that the decrease of amplification from the lower frequencies towards higher frequencies is due to the MOSFET device itself, not to the schematics I designed.

Note: the SPICE model for BF998 is a very approximate model, which in simulations can give strange results. Other SPICE models, for other components, are much closer to the reality than the BF998 model.

~ Daniel VE7LCG

Ferrite...

Below is handy chart for making your own choke/1:1 balun using an FT240-31 core. The type 31 material is the most effective material, for a given core size, when making an HF choke. The goal is to optimize the R_s value for your bands of operation. You can obtain short lengths of RG400 coax with connectors from eBay and Amazon. Shop around while being careful of fake cores from non-vetted vendors.

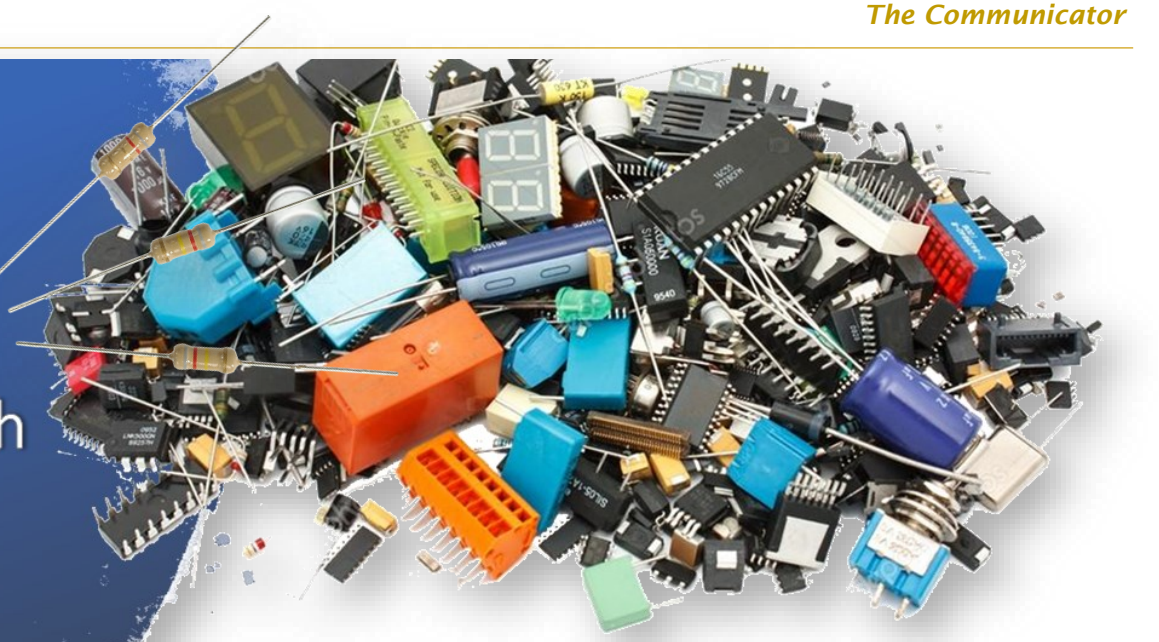


I recommend one choke at the feedpoint and another before the ground connection where your coax enters the house.

...more

Daniel Romila VE7LCG

Daniel's Workbench



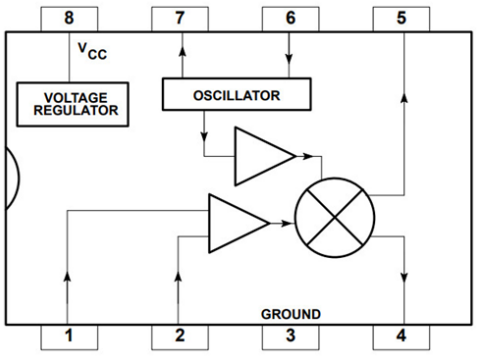
Audio chain with four op amps for direct conversion receivers

In a previous article "Audio chain for direct conversion receivers", published in "The Communicator" from May 2020, page 27 and republished due to the interest in the subject in "DARU Magazine", 5th edition at page 7, I experimented on computer simulations and also on PCB prototyping full chains of audio amplifications for direct conversion receivers.

Such direct conversion receivers eventually have a minimum RF amplification – but I found practically that it is better without this block, a mixer which usually has loss of signal, not gain, and the biggest chunk of amplification is given in the audio part. That means the heavy task of getting an antenna signal from under 1 microvolt to some half volt for the headphones or speaker is on the shoulders of the audio chain. The required audio amplification is at least four thousand, but in the just mentioned case some hundred thousand would be better, if practically attainable.

Cheap modern operational amplifiers allow stable high gain with reduced noise. This can be hindered by an eventual noisy first element like the integrated circuit NE612 which greatly simplifies the construction, but has a high noise of 5 dB at 45 MHz. The conversion gain of NE612 is 14 dB or better at the same frequency of 45 MHz. There is the temptation of gain instead of loss, but it comes with a price. The noise of the first element is amplified by the whole audio chain, that means several thousand times. Low signals from the antenna might be under this 5 dB noise figure, and they will be lost and drawn in the noise of the first element.

Another problem with direct conversion receivers, present in all kind of receivers, is that the strength of various stations differs greatly. There are differences in strength between stations and even for the same station, at various moments in time, but there are also transient clicks which can bang in the headphones. The problem is solved with automatic gain control and some limiters which cut



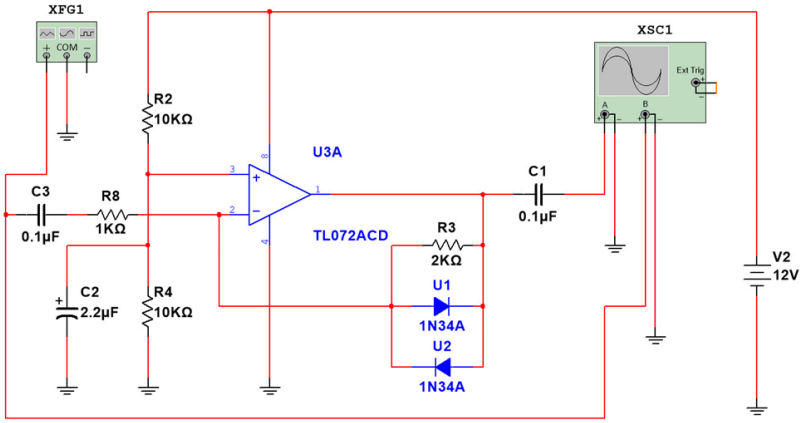
fast transient clicks to protect the ears of the listener.

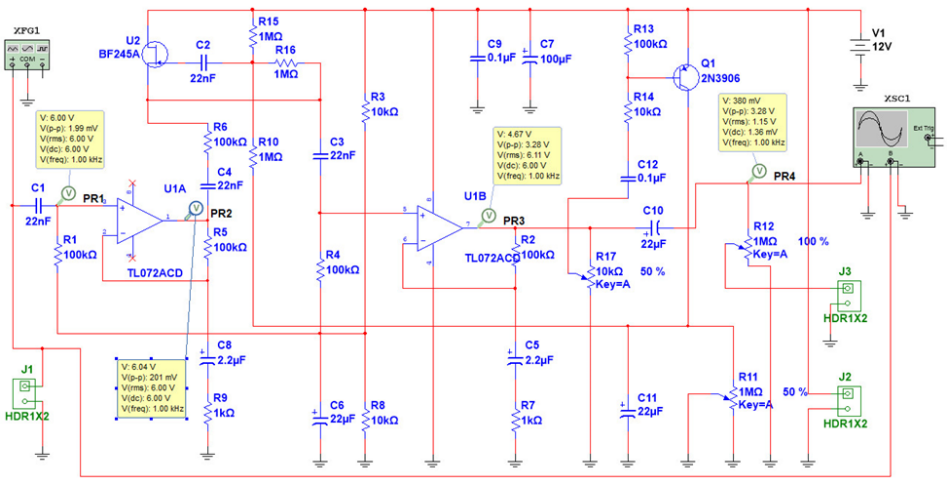
Direct conversion receivers have one advantage of allowing those two problems to eventually be solved directly in audio. For a long time I looked for audio compressor-limiters, starting with schematics published from the 1970s, and I simulated many schematics and built many prototypes on the breadboard to practically visualize them on a digital oscilloscope, based on a signal generator applying input audio signals. The result confirmed my suspicions from my teenage years; many schematics do not work at all, some work and give some compression with big distortions, and just several of them really do a decent automatic gain control function as needed in a direct conversion receiver or for a microphone used in a transceiver.

The simplest method is to put two diodes in anti-parallel into a loop of an operational amplifier *[graphic right]*.

This is more of an "ear-saver", because it introduces significant distortions. It is fast. I found practically that the characteristic of Germanium diodes is more suitable than Silicon diodes in such schematics, as other radio amateurs found before me. The signal is immediately limited but becomes distorted for strong signals, until the amateur listener would adjust a potentiometer for limiting the input signal for the operational amplifier.

An outstanding schematic that really works as AGC (automatic gain control) with low distortions was published in 1997 in "153 practical projects", by Andrei Ciontu, Stefan Ianciu, Vasile Ciobanita and Marius Ungureanu, page 40, chapter 2.12 "Audio compressors with low distortions". I drew the schematics in Multisim 14.2 but kept the initial values for resistors and capacitors, because the compressor also acts as a high band pass filter, above 72 Hz. This contributes to eliminating an eventual "motorboating" sound, which is in fact self-oscillation of the audio chain. My operational amplifier of choice was TL072 and in a second iteration I tried TL084, the FET was BF245 and the pnp transistor 2N3906. Similar ones will work without any problem. For 2 mV peak to peak input and up, the output signal stays around 3.28 V peak to peak. The R11 adjustable resistor dictates the output level. The speed of the response is adjusted with R12 and is shown at the bottom of this page.





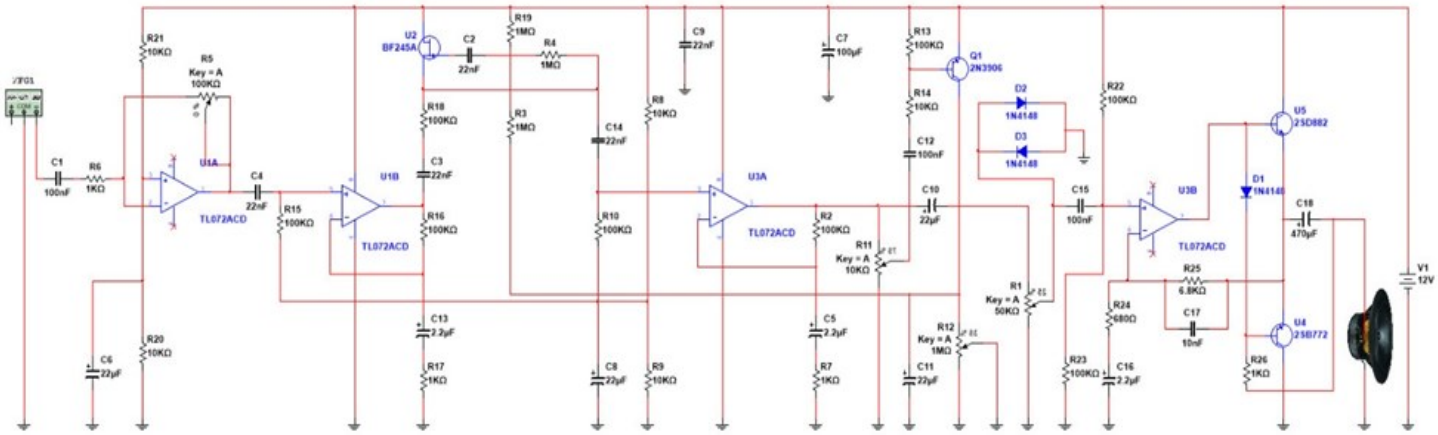
This compressor is the heart of a complete audio chain, but it does not yet have enough amplification, enough power for speaker/ headphones and protection against fast transient clicks.

The final schematic I got to is shown below.

In front I added an inverting amplifier, with low input impedance (practically dictated by resistor R6 (1 KOhm)). The gain of this first operational amplifier is adjusted with R5. Low input impedance of the whole audio chain assures stability against self-oscillation. I also added a final power amplifier, based on an operational amplifier, and with two complimentary medium power transistors. The final audio volume is adjusted with potentiometer R1, which has a logarithmic characteristic. All other semi-adjustable are linear; if replaced with potentiometers they should also be linear. I would not put in big mechanical potentiometers but instead small flat semi-adjustable because of the risk of self-oscillation. I did not try the version with potentiometers. To avoid the same risk of self-oscillation from wires soldered between the PCB and the potentiometer, I recommend the volume potentiometer be soldered directly to the PCB, The input of the final operational amplifier is protected with two antiparallel diodes 1N4148 or similar. They are needed because the compression realized with the active element BF245 takes some time to enter in function. The schematic needs four operational amplifiers. TL084 contains four operational amplifiers in a 14-pin capsule. TL072 contains two op amps in an 8-pin capsule.

While there is a temptation to use only one integrated circuit, the version with two TL072 chips was more dependable to build. Where I used four separate integrated circuits, in fact four TL072 with half of the internal amps not used, the schematic was stable on the breadboard too. The schematic contains many connections and wires. Four separate chips make the whole audio chain easier and more stable. I did not crowd the breadboard and this increased the distance between output and input of the audio chain – so less possibility for self-oscillation.

~ Daniel VE7LCG



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Daniel Romila VE7LCG

Daniel's Workbench

Replacing single use and NiMh rechargeable batteries with LiPo rechargeable batteries

During the pandemic I learned that, at least when talking about batteries and chargers, I can count 100% only on what I have in-house. I like clear and simple things, like knowing I have a walkie-talkie with a dedicated LiPo rechargeable battery, a charger meant for that type of battery, and that as long as the battery is good (and its backups), and I do not forget to charge it, I can use the walkie-talkie, and I can count on it.

The first moment of panic came when my digital kitchen weigh scale stopped working. I needed the weigh scale for measuring the substance for etching a small PCB. I verified the working condition of the tool several days in advance of using it. The battery, a 3 Volt button type, looked strong and the LCD was clear. And when I needed the weigh scale, several days after, the battery was dead. I never had problems before finding these batteries in stores. But, during the pandemic, I found no such batteries anywhere during the several days I looked for them. Anyway, I took the same type of battery out of a digital bath scale, and I saved the situation… for a while.

I decided to try to replace everything with LiPo rechargeable batteries for all the electronics I have, including a Sony 7600G shortwave radio which takes 4 AA rechargeable batteries.

NiMh rechargeable batteries have a nominal voltage of 1.2 V, while non-rechargeable batteries usually have 1.5 V. That means that if I use 2 rechargeable AA NiMh batteries in a remote control – for example – I will get 2.4 V instead of the required 3 V. It might work or not. I already have wireless mice, remotes and keyboards that suddenly and unexpectedly die, because I use these NiMh batteries. The nominal voltage for LiPo rechargeable batteries is 3.6 (declared as 3.7 in some articles), but they can be charged to 4.2 V. That means that if I replace a 3 V battery or set of batteries with a LiPo one it has a good chance to be OK, as long as it fits.

Disposable batteries also have a bit more than 1.5 V when new, so the electronics requiring a 3 V power supply usually do not fry at 4.5 V for a short time either.

Going in this direction I definitively solved the problem for all the weigh-scales in the house and all remotes in the house taking CR 2032 button cells.

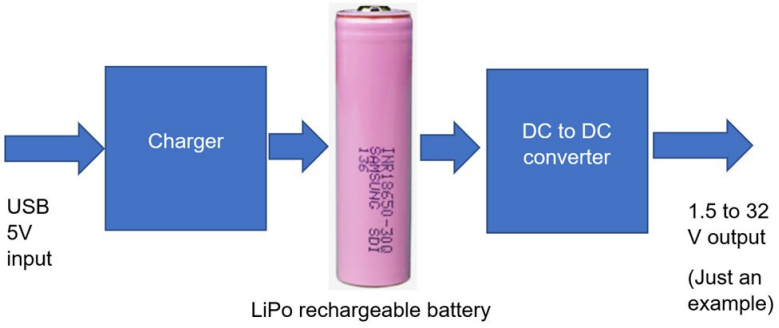
I bought 5 such LiPo batteries for C$5 (= € 3.81 = 65 ZAR), shipping and taxes included, in September 2022.

For another C$ 5 (= € 3.81 = 65 ZAR), also with shipping and taxes included, I bought an incredibly crappy charger for them. But it works and it does the job.

Seldom in my life have I had such a crappy product.

I even disassembled it, because the LCD that is supposed to show how charged the battery is did not show anything. Actually, the backlight, a simple LED, was put in a corner, and I could see only that point of light, not the whole LCD. The sockets for the batteries are simply in parallel, so one damaged battery would compromise the charging of all connected batteries. The LCD shows nothing useful, one bar for 25%, two bars for 50%, three bars for 75% and four bars for 100%. The LCD would continue to show the state of the rechargeable battery even after the charger was unplugged, that means it would drain the batteries that it just charged. But it works, and I am happy with the replacement of the 3 V single use batteries with LiPo 2032 batteries. All 5 present the same characteristics, and they are solid keeping their voltage and working in everything I tried. The charger itself is good for 2016, 2025 and 2032 batteries, where the bigger the number the bigger the capacity of the battery and the thicker the battery, with the same diameter.

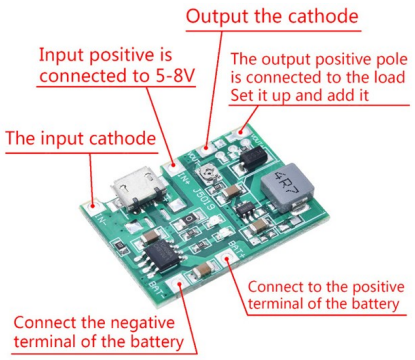
Those button batteries are indeed only LiPo rechargeable batteries, without any electronics inside. I built modules for obtaining other voltages, having the LiPo 3.6 battery in the middle of the schematic, with a charger circuitry in front and a DC-to-DC converter after, to transform 3.6 V into 1.5 V, 9 V or whatever.



There are ready made boards with everything on them. They require the radio amateur to only provide the LiPo rechargeable battery and to make the wire connections. Even the USB connector is already soldered on these modules, available for around 1 CAD = 0.76 EURO = 13 ZAR (shipping and taxes included) or even cheaper, if bought in bulk of 5 – 10 pieces.

The 3 V battery replacement with LiPo was easy and cheap.

In September 2022, I cannot say replacing other sizes of batteries are as inexpensive yet.



Building a project comprised of a dedicated board and a LiPo battery is not an easy road, because it requires modifying the case of amateur equipment. It is cheap, but it requires some work.

A not so cheap road is to replace whatever battery with an assembly shown above ready made by a manufacturer, and already encapsulated in the shape of the battery it is intended to replace.

I always mistrusted the 9 V batteries and yes, I do have a cheap digital multimeter supplied by a 9 V battery. It's

been there for the last 2 years and I verify from time to time that it doesn't leak, because I use that digital multimeter every single day. Why should I change the single use 9 V battery if it lasts so long? Oh, well, it is just for the sake of experimenting, researching. In short, what I present next does not really have economic good reason in September 2022, but I'm sure the prices will go down in the immediate future. All prices went up, except for electronics.

This kind of assembly usually has a USB port from which you can charge the LiPo battery. Some have USB-C type connectors and it can be more difficult to get such a cable. It is better to buy the battery and the charging cable from the same vendor. If something goes wrong one can deal with only one supplier instead of two suppliers throwing the blame from one to another.

The USB charger itself has to be supplied by the user himself/herself.

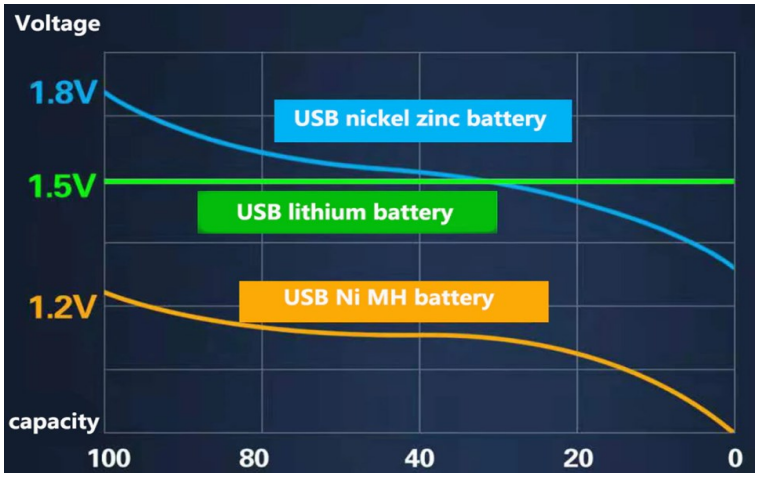
In September 2022 I found online such 9 V batteries for C$ 4 - 32 (= € 3 – 25, 56 – 415 ZAR). They are not exactly cheap. It is not exactly clear why some batteries are several times more expensive, at the same declared capacity.

I am very close to buying some 1.5 V LiPo assembled in AA size.

I very much like that they have a detachable cap and that I can connect them directly to the USB charger, without any cable. I hunted for the cheapest price, and I can buy them in September 2022 for 24 CAD (= 18 EURO = 311 ZAR), shipping and taxes included, four pieces in one package.

I found other 1.5 V AA and even AAA LiPo batteries, with the USB charging connector on a side.

The prices are also in the above declared range and vary greatly from vendor to vendor. You may wonder why bother with such devices. Many vendors post a graph of



the voltage supplied by this LiPo assembly. I copied it: https://www.aliexpress.com/item/1005003482039111.html?

Many vendors post exactly the same graph.

On the X axis the graph posts “capacity”. Actually, the capacity is in percentage, not in milliamps.

Reading the reviews from buyers I noticed (as expected) that the declared capacity is usually fake. I found AAA USB LiPo declared as having 3800 mA. I suspect they are 380 mA, 10 times less, as measured by several buyers. Another complaint is that around 25% of the products bought do not work or partially work, like not having the charging LEDs lit. Such a fault rate is scary for so expensive a product, that are also difficult to return.

This article only showed you what it is available and what can be bought. That does not mean the prices now justify a move to replacing the single use batteries and NiMH rechargeable batteries with rechargeable LiPO assemblies.

I just bought (September 2022) a pack of 10 AAA batteries from Dollar Tree for C$ 2 (= €1.5 = 26 ZAR) including taxes. The price is the same for a pack of thicker AA batteries.

~ Daniel VE7LCG

Another fight with LiPo and single use AA and AAA batteries

I was unhappy that I had LiPo rechargeable batteries only in the walkie-talkie and digital cameras, while other devices were left to be powered with AA and AAA batteries. For several years I was successful in replacing those single use batteries with NiCd and NiMh batteries. They worked on 1.25 V instead of 1.5 V. it is bearable if the electronic device requires only one or even two such batteries, because the loss of voltage is in the range of 0.25 V to 0.5 V, but the problem is bigger if the device required 4 or 6 AA or AAA batteries. When you replace 6 V with 5 V or 9 V with 7.5 V the electric device might no longer function properly.

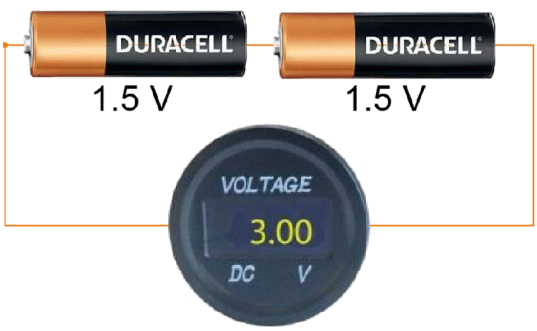
I especially wanted to get rid of the AAA batteries, single use or NiMh rechargeables, because they always had

problems and I had to replace them often.

One solution I explored in a previous article was to buy some devices having the same shape as the single use batteries I wanted to replace, but containing a LiPo 3.7 V battery, electronics for charging and electronics for converting from the 3.7 V into whatever nominal voltage the single use replaced battery had.

The idea sounded good in theory, but financially it does not look as well. I can buy 10 AA or AAA single use batteries for C$1.25 (= US$ 0.91 = €0.93 = 16.41 ZAR) plus taxes from Dollar Tree stores in October 2022. I need to use the replacements for 8 - 10 years in order to break even. Do you really think the electronic assemblies you see in the pictures above will continuously function, recharge at satisfying level and be OK for 8 - 10 years? I do not. I expect such devices to eventually function 3 - 4 years at maximum, and buyers report a lot of them dead on arrival, as many as 25%.

In this article I go on another route, and I already bought everything I need to implement this new Idea I have. If it is to replace 2 AAA batteries with a LiPo rechargeable battery I would replace 3 V with 3.7 V. Not so bad. I only worried about mechanically changing the case for the batteries, but not even that is necessary. There are LiPo rechargeable batteries already built in the AA and AAA shape and sizes. There are also dummy batteries, which are in fact just a short. I have drawn the following two schematics in Multisim 14.3, and I put them on top the pictures of batteries, replacements and voltmeter just to be clear.



Two single use 1.5 V batteries in series generate 3 V *[graphic bottom left]*. They can be replaced by a LiPo rechargeable 3.7 V in series with a dummy battery (a short). No need to do any mechanical work inside the electronic device where I want to place them. The LiPo can just be taken out, charged again in a dedicated LiPo charger and put back fully charged.

The 18650 LiPo rechargeable battery is better known than other sizes and shapes of LiPo rechargeable batteries, but there are many other versions. The types I bought are

14500 for the AA battery and 10440 for the AAA battery

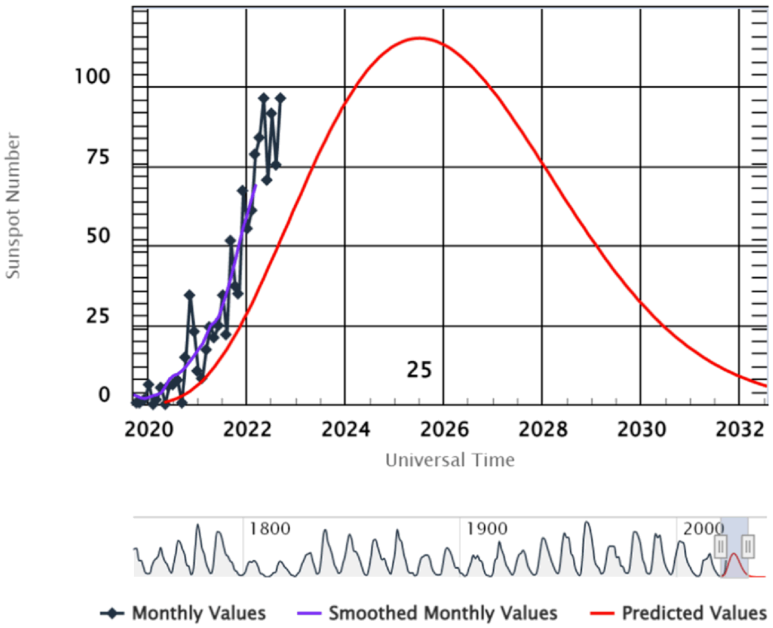
They are around C$6 (= C$4.36 USD = €4.45 = 78.73 ZAR), shipping and taxes included on the Chinese websites, in October 2022). The small ones, the AAA batteries tend to cost more. The dummy ones (= short) are half price in comparison with the real LiPo, the 14500 and the 10440 ones. The charger is just a bit more expensive than buying four 14500 rechargeable LiPo batteries. It varies from vendor to vendor and I avoid giving exact prices to the cent because immediately after I bought everything the prices slid down. It took me a couple of minutes to regret spending the several cents more (LOL), and other vendors appeared, slightly cheaper. Anyhow, the prices given here are a good orientation for everybody wanting to repeat my experiment.

It's worth doing it when taking into consideration the LiPo electronic assemblies presented in pictures at the beginning of this article, and compared to a solution being 4 - 15 times more expensive and – according to many buyers, with 25% of them - unreliable.

Note: some materials declare 3.6 V as the nominal voltage for LiPo batteries, others declare 3.7 V. It does not change anything in regard to this article.

~ *Daniel VE7LCG*

Solar cycle 25 progression



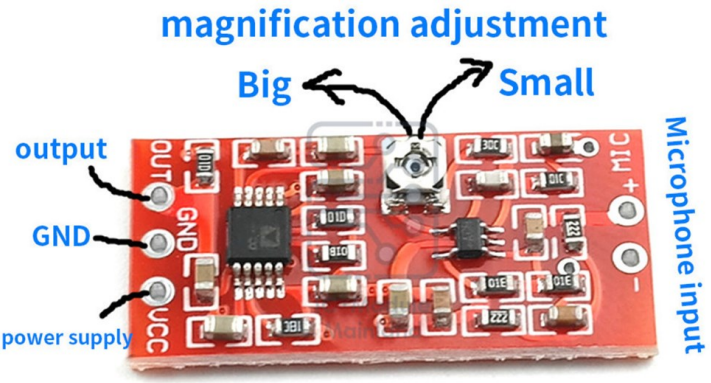
Daniel Romila VE7LCG

Daniel's Workbench

Microphone modules

This article presents ready made modules the radio amateur can use directly by connecting an electret microphone in front (some modules already have the microphone soldered on the module) and the 'audio in' of the transceiver at the output. The modules are usually power-supplied from 3V – 5V and they are compressors, noise reducers, amplifiers or combined functions. The modules can be bought online for several Cdn /US dollars, and they can simplify homemade projects.

I wrote this article because it is difficult to know what the modules do and their specifications, because vendors do not publish much. I looked at the integrated circuits on those boards, the possible schematics and the datasheets. This is how I came up with the details for this article,



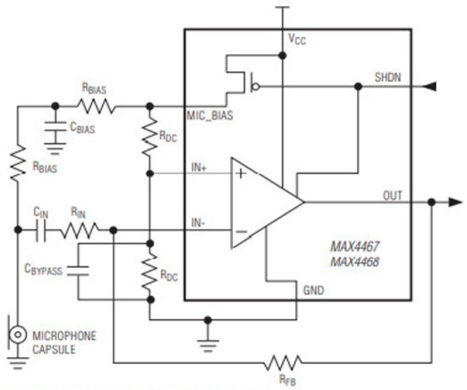
much more than what vendors themselves declare, which – I repeat – is close to nothing. I would not buy a "microphone compressor" product, but I might get interested if I were told what the input audio signal needs to be, and what value of output signal, the range of frequencies and so on.

An amplifier-compressor board can be bought for C$6.44 (= €4.82 = US$ 4.70 = 85.15 ZAR), shipping and taxes included, in October 2022:

"Magnification" I suppose is the machine translation for "gain". It has a MAX4466 amplifier integrated circuit followed by a SSM2167 dedicated compressor integrated circuit. Looking on the datasheet of those circuits:

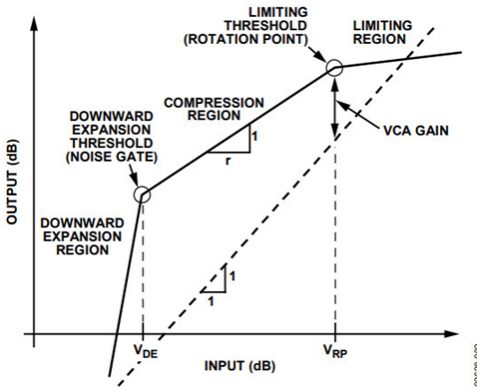
- MAX4466 integrated circuit has a bandwidth of 600 KHz (overkills the necessary audio) with an open loop amplification between 80 and 125 dB. The total harmonic distortion is under 0.03% and the equivalent noise at the input is 80 (nV/square root of Hz). It is OK from the noise point of view, like the majority of op amps with J-FET

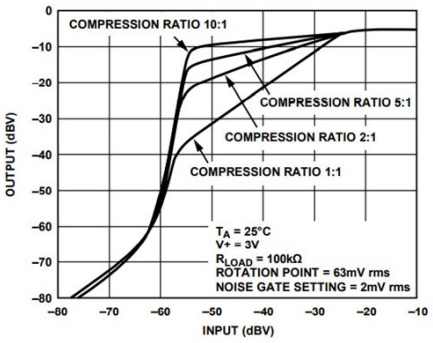
transistor input, but not a very low noise op amp. The typical application electronics schematics, from the datasheet:



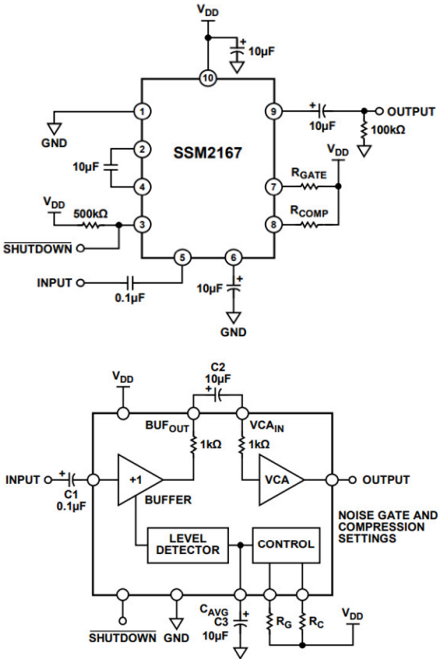
MAX4467/MAX4468 TYPICAL OPERATING CIRCUIT WITH COMPLETE SHUTDOWN

- SSM2167 compressor has a bandwidth of 20 KHz and total harmonic distortion 0.2%. The compression is adjustable between 1:1 to 10:1 by adjusting some resistor. Another resistor adjusts the noise gate threshold – that means the value after which the compressor really enters into the compression function as in the graph (from the datasheet). Before that region it just amplifies everything is at the input.





The typical application circuit and internal block diagram is shown:



From what I see on the boards a 38KOhm resistor is used for setting the compression ratio, that means some 3:1, according to the table from the datasheet.

Setting Compression Ratio

Compression Ratio	Value of R_{comp}
1:1	0 Ω (short to V+)
2:1	15 kΩ
3:1	35 kΩ
5:1	75 kΩ
10:1	175 kΩ

On the boards that I looked at, the noise gate resistor was 910 ohm. According to the datasheet that means the compression starts at some -48 dbV:

Setting Noise Gate Threshold

Noise Gate (dBV)	Value of R_{gate}
–40	0 Ω (short to V+)
–48	1 kΩ
–54	2 kΩ
–55	5 kΩ

It is possible to adjust the level of audio input signal into the compressor circuit with the semi -adjustable potentiometer soldered on the board.

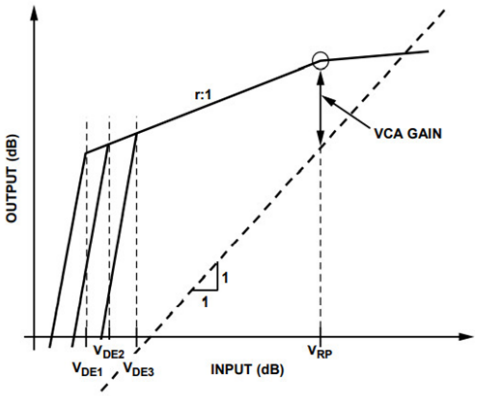
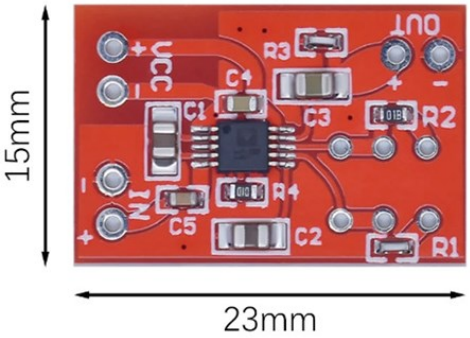


Figure 18. Effects of Varying the Downward Expansion (Noise Gate) Threshold

As seen above, this board is quite a complex one, which allows adjustments for the real situation which it would be used for by the radio amateur.

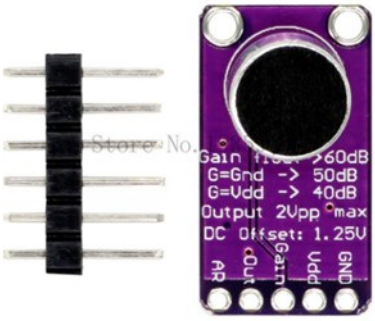
There is a separate compressor board available with a SSM2167 for C$ 5 (€=3.74 = US$ 3.64 = 66.05 ZAR) in October 2022, shipping and taxes included.

An amplifier board containing an already soldered electret microphone with a MAX4466op



amp is around C$3 (= €2.24 = US$ 2.18 = 39.63 ZAR) in October 2022, shipping and taxes included.

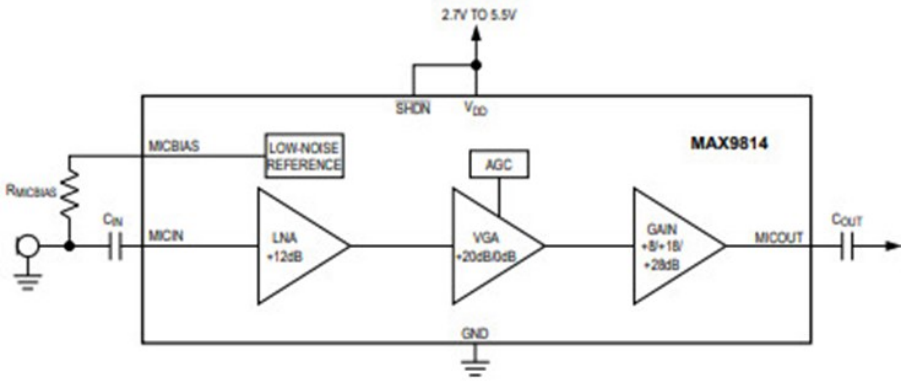
There are boards based on MAX9814, that combine the function of a low noise op amp (value 30 instead of 80 as in the previous MAX4455 op amp) with compression.



Features:

- Automatic Gain Control (AGC)
- Three Gain Settings (40dB, 50dB, 60dB)
- Programmable Attack Time
- Programmable Attack and Release Ratio
- 2.7V to 5.5V Supply Voltage Range
- Low Input-Referred Noise Density of 30nV/√Hz
- Low THD: 0.04% (typ)
- Low-Power Shutdown Mode
- Internal Low-Noise Microphone Bias, 2V
- Available in the Space-Saving, 14-Pin TDFN (3mm x 3mm) Package
- -40°C to +85°C Extended Temperature Range

Internal block diagram:



The output amplifier has three optional gains: 8 dB, 18 dB and 28 dB. In the absence of compression, cascaded amplifiers can achieve a total gain of 40 dB, 50 dB or 60 dB. Three-state digital input programming sets the gain of the output amplifier. The external resistance divider controls the automatic gain control threshold, and a single capacitor can set the start/release time. Three-state digital input can also be programmed to set the ratio of startup time and release time. The AGC holding time is fixed at 30 mS.

Such a board, with the electret microphone already soldered on it, can be bought for C$ 5.10 (= €3.81 = 3US$ .71 = 27.74 ZAR) in October 2022, shipping and taxes included.

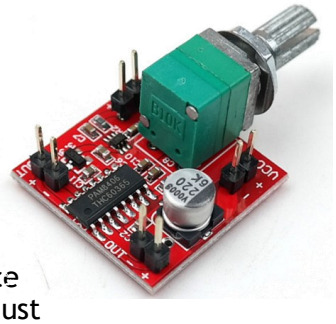
For the same price one can buy a simple board with a MAX9812 op amp amplifier, with fixed gain at 20 dB (10 times). The seller declares the board as being 3.6 to 12 V supplied power.

The board indeed contains a the MAX9812 integrated circuit and a voltage stabilizer, which makes me me believe the MAX9812 used is the 3V version, not the 5 V version, so the microphone bias supply is 2.3 V, not 4 V. There is no soldered microphone on it.

One can buy many different microphone modules on the Internet. There are prices so variable that I do not dare to give a reference price, and I'll just say

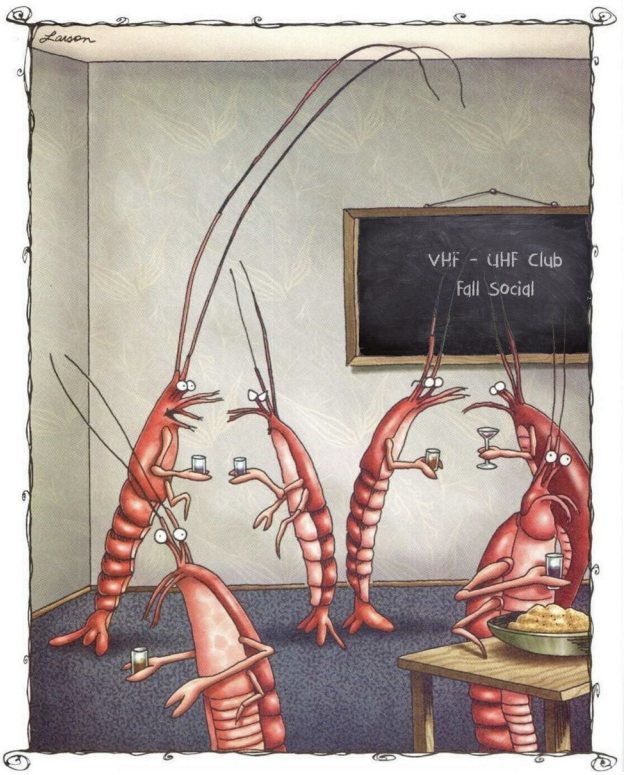
that they cost under US$ 7. There are boards with the microphone soldered on them and only a one transistor amplifier, and also some with an op amp on them, stereo power amplifier (2 X 3 Watts) with potentiometer (the same signal for left and right, so mono).

I wrote this article with the intention to give readers an idea what is available out there ready made and what those modules are, because usually the vendor says close to nothing. For example, many vendors sell a JRL21 microphone HD (???) noise reduction module:



Looking at the other face of the PCB I see the integrated circuit is JRL21. I could not find its datasheet anywhere. A very close look at the module (and having plenty of experience with the Chinese products – LOL) tells me the soldered microphone is for noise cancellation, not for voice input. It seems the useful signal must come through MIC+ and MIC- on the upper left corner. Or is it the other way around? No information, no purchase from me.

~ *Daniel VE7LCG*



"Listen, you want to come over to my shack?
I get a great signal on 80m"

Ham Hardware

Pascal Schiks, PA3FKM

Antennas for Baofeng transceivers

Pascal received questions about antennas for handhelds. He didn't let it pass unnoticed and conducted a proper test. Which antenna came out on top?

Introduction

Some people abhor it, but the fact is that they are there: Baofeng handhelds. They are as famous as they are reviled. Almost all of those things use the same chip (the RF H87F5108 as I remember). Reviews of the Baofeng are plenty, and they all come to the same conclusion: 'rubbish'. Nevertheless, there are few amateurs who have been able to resist the temptation to purchase one.

I don't have much use for handhelds myself, but I received some questions about the subject a good six months ago and then decided to familiarize myself with the issue. And when I went digging in the basement, to my surprise I came across a whole stock of old handhelds; in 36 years you cannot help but collect a few...

After some experimentation, the antennas soon generated some discussion. General opinion: 'The original antenna supplied with the Baofeng is bad'. At first, I thought that this was not entirely true, and that the supplied antenna is fine, considering that the transceiver has a very broad frequency range. We radio amateurs only use a small part of that; we limit ourselves to frequencies around 146Mhz and 435MHz, and there are antennas that are much more suitable. Well, I set to the task and did some simple measurements.

The antennas tested

The antennas I tried are all fairly common and available through the well-known websites.

1. *Baofeng Standard* The standard antenna that comes with the Baofeng and similar 'Bami' handhelds.
2. *Nagoya-771* A very well-known antenna that I am very excited about. In this experiment however, it certainly does not come out on top.

3. *Abbree-42.5-Inch* A flexible 'tape measure' antenna that is available in different lengths.
4. *TengKo RH660S* A telescopic antenna of about 105cm length.
5. *Hot-Spot* The antenna that is often used on DMR hotspots.
6. *Flexi* A funny 'rubber duck' that I still had lying around. Only suitable for 2m.

The antennas tested, all on a row

There are of course many more, but I already had these antennas at my disposal, so I just kept it at that.

Measurement methods

Very pragmatically I tried to investigate what the radio amateur wants to know, namely: how well does the thing work? Or better yet: what is the actual SWR and the loss of power? That is the first question, because the answer to it tells something about the high-frequency properties of the antenna.

For measurement I simply used a setup with a VNA (Vector Network Analyzer) with which the SWR and the return loss of all antennas were measured in the same way. Afterwards I thought that I would have been better off logging the S11 and S21 parameters and then calculating the rest myself, but I had already packed things up again. and I have other things to do... I've brought the measurement results together in a few graphics.

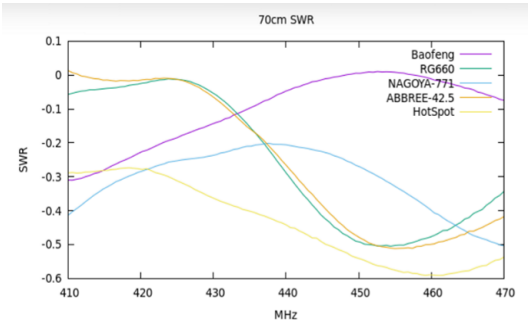
I am not handy enough with GNUPLOT to scale up the *1 to n* that we use without messing up the graph, but the essence is probably clear.

At 2m, none of the antennas offer a clear dip, but the original Baofeng antenna gives a notable and dramatically bad result.

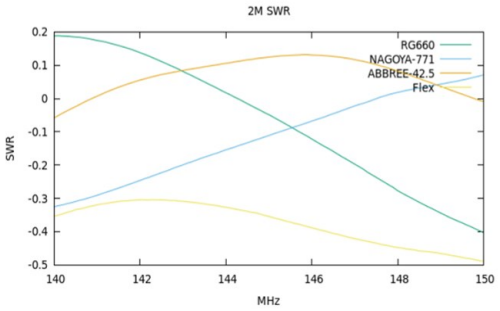
It is important to mention that during the measurement I always held the SMA connector firmly to serve as counterpoise. Without it, there was no indication that the antennas' function. I do not know how you can achieve the same result with the all-plastic housing of the Baofeng.

DARU Editor's note: All mobile and basic antennas need a counterpoise (mass). A counterpoise benefits the efficiency of the antenna. In mobile use, the metal body of

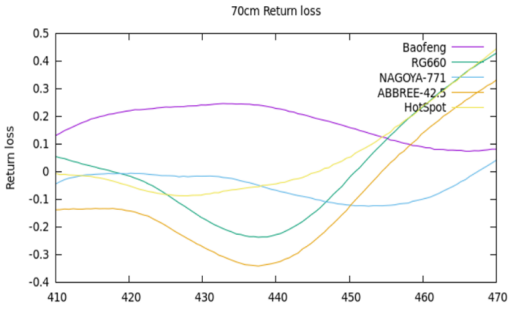
Antenna Standing Wave Ratio at 70cm



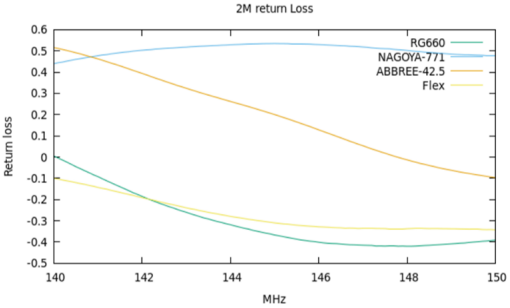
Antennas Standing Wave Ratio at 2m



Return loss at 70cm



Return loss at 2m



the car creates mass. The shielding of coax can also provide a counterpoise city. With a handheld transceiver antenna, the counterpoise is largely lacking. This is less of a problem for reception than for sending. When transmitting, the person holding the radio is part of the antenna system, since a human being consists of about 65% water. At 70cm, that link with the owner of the device is the most effective, because there is relatively little capacity (pF) between hand and transceiver sufficient to produce a nice signal. Note: if the handheld is in a bag or case, this reduces the coupling with the person holding it and the operation of the antenna is therefore a bit less. If you use a separate (external) microphone, the microphone cord provides some counterpoise.

How well does the antenna receive?

Very pragmatically I screwed the antenna to a step attenuator and saw how far I could go chatting on a popular repeater until I could no longer understand. I could only perform this test at 70cm. Of course, this is 'best-guess work', but it is a pragmatic approach to the question about using other whips instead of the standard.

The results are shown in the table of measured results directly below.

The operation of the antenna in practice

To investigate this, I enlisted the help of Sandra PD5FRE. We stood at a distance of 3 km from each other in an open field and put the handhelds on low power (about 1 Watt).

Only I changed the various antennas, Sandra kept the same configuration and the same settings during all tests.

Results

The results are shown in the table of practical results directly below.

Remarkable was Sandra's remarks that in some cases the connection was better when the radio was held horizontally. I have always kept the device (on the transmitter side) neatly upright.

Quality

Actually, I am reasonably satisfied with the build quality of all antennas. However, the best antennas tested are more susceptible to damage as the length increases. The Nagoya can tolerate quite a bit but has now suffered some kinks with use. The whip is riveted on the mount, if you pull it loose then the thing becomes worthless.

The Abbree antenna is very long, and I fear for damage to the SMA connector of the handheld. I've also heard that frequent bending can also permanently damage this

Measured results

Baofeng Standard	35dB
Nagoya-771	35dB
Abbree-42.5-Inch	55dB
TengKo RH660S	40dB

Practical results

	70cm	**2m**
Baofeng Standard	58/59	57/0
Nagoya-771	58/59	0/53
Abbree-42.5-Inch	59/59	58/59
TengKo RH660S	59/58	58/59
Flexi N	Not applicable	Not applicable
Hot-Spot	Not applicable	Not applicable

antenna. As a telescoping antenna, the TengKo is inherently fragile of course, but nevertheless I think its quality is excellent. With the other antennas you have to be very imaginative to make them break.

Final assessment

This is, of course, anything but a thorough scientific approach. It is more of a pragmatic comparison done in a way that a consumer association would probably do it. Well, here are the findings:

Baofeng Standard

It is claimed that this antenna is downright bad. However, it is intended for a very large frequency range (not just the amateur bands) so you must make compromises. However, the measurement results speak for themselves... the thing is not good for anything!

Nagoya-771

I expected it to come out very well. The thing works fine at 70cm but is certainly not a winner and at 2m it scores only moderately.

Abbree-42.5-Inch

This antenna works a lot better than most others. Note: the thing more than a meter long, and that is not very convenient. Even though it is a bendable antenna, I understand that it is not as sturdy as you might expect. I especially think that the SMA connection at the mount is heavily loaded by this antenna.

TengKo RH660S

Completely against my expectations, this antenna scores the best. In fact, with some sliding of the length I got the thing right inside the band.

Hot-Spot antenna

If I can believe the measurement results, it comes out on top, but I doubt whether the thing really shines as I skipped the practical test. The thing is only half as long as the original Baofeng antenna.

Flexi antenna

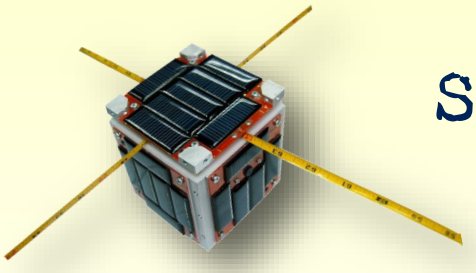
Yes, it's a toy, but I don't think it's useless. Unfortunately, this antenna failed during the practical test. It transmitted well, but I couldn't receive the other station.

Finally, the lack of a decent counterpoise is obviously a thing with handhelds, especially when it involves such inexpensive devices. I did the same thing a few years ago with airborne video transmitters for 5GHz; those things got hot but not much came out. When I replaced the factory whips with groundplane antennas, the difference was huge.

Of course, there are many more antennas suitable for the various handhelds, but I had these available and this was the primary question. I am considering doing a similar test for small light Yagis for 70cm, but that will take a while because the project for which that intended still has a while to wait.

~ Pascal PA3FKM

This article was translated and reprinted from DARU Magazine #30, September 2022. We thanks the author for its use.



Satellite News

NASA's upcoming Artemis I mission

Ham TV to Return to the ISS

During the AMSAT-UK Space Colloquium on October 8th, AMSAT announced the Ham TV unit for the ISS is repaired and on the way to Houston for testing. The flight date dependent on testing.

Ham TV has been inoperative since April 2018. It had been active since April 2014, having been launched to the ISS in 2013. It was returned to earth for diagnosis and repair in late 2018.

The ARISS Ham TV transmitter is capable of downlinking DVB-S digital video of ARISS contacts and other activities on board the ISS to amateur ground stations in the 2.3 GHz amateur band. More information can be found at https://www.ariss.org/hamtv-on-the-iss.html

~ ARISS

Apollo TV From the Moon

I follow this guy's YouTube channel. He's captivated by space communications, particularly Apollo era stuff. He has reconstructed an entire Apollo RF chain with gear on loan from a private museum. Very impressive guy with some smart friends and a great home lab. Marc Verdiell is also a Ham AJ6JV, and has many other very cool videos. He goes by the handle "CuriousMarc" (www.curiousMarc.com)

Thought your ATV newsletter readers might enjoy watching this one.

https://www.youtube.com/watch?v=msWnY2zKS9o

Part 22 - "NASA's Daring Moon TV Upgrade: Live Color for 1970" The video runs for 23minutes. Another one on YouTube is "Apollo TV From the Moon" - part 21 (26 mins)

~ Dave K7DMK

Boulder Amateur Television Club TV Repeater's REPEATER newsletter—October, 2022

2ed edition, issue #113 BATVC web site: www.kh6htv.com

Amateur satellite database

Mineo Wakita JE9PEL and Ben Welsh KN6VVP) have set-up an up-to-date database of Amateur Radio satellites with links to the SatNogs database.

https://amsat.org/amateur-satellite-index

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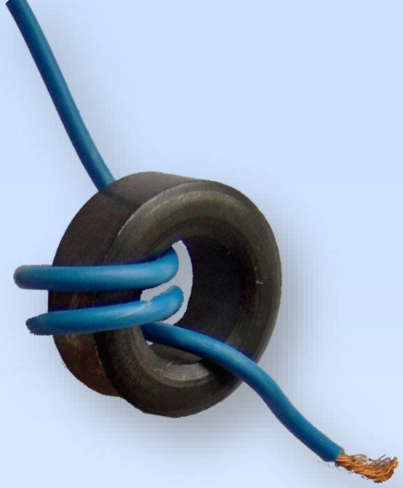

The ferrite bead mix mystery

Common mode chokes work by adding a large value of resistive impedance in series with the common mode circuit. This impedance creates a passive filter attenuating noise, while letting the signal pass.

Ferrite Mix Selection Guidelines

You may find ferrite beads inexpensively on sites such as Amazon but they are often not labelled as to the ferrite mix they contain. This is a critical characteristic as the wrong mix will not attenuate the correct frequency. There is a lot of misinformation on the internet and elsewhere regarding the selection of proper mix for a given application.

What's Different between Mixes?

The "Mix" is the chemical formula of the iron oxide. Ferrite is a ceramic consisting of iron oxide and generally either of two types:

1. **Manganese-zinc** (MnZn) available as Mix #31, #75 and #77 (and others) – work well for common mode chokes.
2. **Nickel-Zinc** (NiZn) available as Mix #43, #52, #61, (and others) – generally preferred material for baluns/ununs.

The MnZn ferrite cores (Mix 31, 73, 75) offer high 'Q' factors for the 1 KHz to 1 MHz frequency range. Cores from this group of materials are widely used for radio as they are very useful for the attenuation of unwanted RF noise signals in the frequency range of 2 MHz to 250 MHz.

Manganese-zinc ferrites are generally used in inductor applications where the operating frequency is less than 5 MHz.

The NiZn ferrite cores (mix 43, 52, 61) are for the 500 KHz to 100 MHz frequency range. They are well suited for low power, high inductance resonant circuits. Nickel-zinc ferrites have a higher resistivity and are used at frequencies from 2 MHz to several hundred megahertz.

For most Amateur Radio applications, mix 31 and 43 is likely your best choice as their parameters are most appropriate for HF and low VHF frequencies.

Are solid ferrite rings better than split rings?

Two rings of similar weight, hole-size and ferrite mix were compared. One was solid and the other was split. The results were almost identical when tested. This tells us that shopping for solid cores have no real advantage over split cores. However, the split ferrites can be applied to cables without having to remove connector plugs and this makes them a more practical purchase.

Color Code Marking	Mix Number	Frequency Range	Popular For
Blue	31	1 MHz - 300 MHz	most popular
Silver	43	25 MHz - 300 MHz	VHF
Orange	52	200 MHz - 1 GHz	UHF
Red	61	200 MHz - 2 GHz	UHF
Green	75	150 kHz - 30 MHz	160-80 meters
Pink	77	100 kHz - 50 MHz	160-80 meters

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Short antennas

John Brodie VA7XB

Short antennas are what many of us are forced to consider if we want to operate HF in locations with limited space, or with strata regulations or other constraints that suggest concealment or minimum visibility. Compromises are necessary but in many cases good results can still be achieved with proper design. "Short" usually means short with respect to the resonant half wave dipole. In such cases the bandwidth is narrower, feedpoint impedance is reduced and gain is compromised by lower efficiency of the radiator. The resonant frequency of an antenna is not the frequency at which the SWR is minimum, but the frequency at which the inductive reactance (XL) and capacitive reactance (XC) cancel out, leaving the effective radiation resistance (R) the only remaining component of impedance (Z). If the antenna is short with respect to the half-wavelength it will be characterized by XC, and if long XL. The radiation resistance (R) is effectively what dissipates the RF energy by radiating it.

Ideally, for the coax that we commonly use, R of the antenna should be 50 ohms, X should be zero which means Z will also be 50 ohms. These are seldom achieved in practice and the departure from ideal is commonly measured as an SWR (standing wave ratio) greater than 1:1. To restore the feedpoint impedance of short and long antennas, coils or capacitors, respectively, can be provided to balance the excess XC or XL. Shortened antennas always need some type of matching device, often built into the commercial products. A greater likelihood of interference to neighbourhood electronic devices and personal exposure to RF may be expected with short antennas, so low power is the norm. If the antenna is located indoors, a large amount of the RF energy may be absorbed by building materials, especially wire in stucco and rebar in concrete, although wood itself is largely transparent to RF. Location of equipment on the top floor of tall buildings obviously provides better propagation especially if there is access to the roof top, and it also presents more isolation from the majority of other tenants; however long grounds are virtually useless. Lower floors provide better opportunity for grounding and good possibilities for ground-based antennas. Many shortened antennas are non-resonant and may need an external tuner for a match to allow the maximum transfer of power from the transmitter to the antenna. A current balun is often beneficial to prevent RF from flowing on the outside of the coax and can be provided in many forms, such as snap-on ferrites, ferrite beads, and loops of coax. One way to facilitate multi-band antenna operation is to use traps tuned for different frequencies. Visit eHam for product reviews http://www.eham.net/

- Get the antenna outside
- Consider balanced (dipoles, yagi's loops) antenna systems first as "grounding" systems not required
- Verticals and long wires require radials or a counterpoise
- Long wires require a counterpoise and tuner
- Keep the antenna away from metallic objects
- If moving to a new location, choose an antenna-friendly site

~ John VA7XB

Internet Archive Seeks Donations of Materials to Build a Digital Library of Amateur Radio and Communications

Internet Archive has begun gathering content for the Digital Library of Amateur Radio and Communications (DLARC), which will be a massive online library of materials and collections related to amateur radio and early digital communications. The DLARC is funded by a significant grant from the Amateur Radio Digital Communications (ARDC), a private foundation, to create a digital library that documents, preserves, and provides open access to the history of this community.

The library will be a free online resource that combines archived digitized print materials, born-digital content, websites, oral histories, personal collections, and other related records and publications. The goals of the DLARC are to document the history of amateur radio and to provide freely available educational resources for researchers, students, and the general public. This innovative project includes:

- A program to digitize print materials, such as newsletters, journals, books, pamphlets, physical ephemera, and other records from both institutions, groups, and individuals.
- A digital archiving program to archive, curate, and provide access to "born-digital" materials, such as digital photos, websites, videos, and podcasts.
- A personal archiving campaign to ensure the preservation and future access of both print and digital archives of notable individuals and stakeholders in the amateur radio community.
- Conducting oral history interviews with key members of the community.
- Preservation of all physical and print collections donated to the Internet Archive.

The DLARC project is looking for partners and contributors with troves of ham radio, amateur radio, and early digital communications related books, magazines, documents, catalogs, manuals, videos, software, personal archives, and other historical records collections, no matter how big or small. In addition to physical material to digitize, we are looking for podcasts, newsletters, video channels, and other digital content that can enrich the DLARC collections. Internet Archive will work directly with groups, publishers, clubs, individuals, and others to ensure the archiving and perpetual access of contributed collections, their physical preservation, their digitization, and their online availability and promotion for use in research, education, and historical documentation. All collections in this digital library will be universally accessible to any user and there will be a customized access and discovery portal with special features for research and educational uses.

We are extremely grateful to ARDC for funding this project and are very excited to work with this community to explore a multi-format digital library that documents and ensures access to the history of a specific, noteworthy community. Anyone with material to contribute to the DLARC library, questions about the project, or interest in similar digital library building projects for other professional communities, please contact:

Kay Savetz, K6KJN

Program Manager, Special Collections

kay@archive.org

Twitter: @KaySavetz

Ham Radio

VA3KOT

John Corby

Hello, What's Going On Here Then?

Do you ever feel slightly guilty about operating your ham station out in the big blue sky shack in full view of the public? I do. A ham station can look very suspicious to somebody who doesn't understand the hobby.

Where I like to operate there are often signs with rules about "permitted activities". The list usually includes such pursuits as hiking, dog walking and cycling. The signs always conclude with the ominous statement "all other activities are prohibited".

On a recent camping trip in an Ontario Parks campground I noticed the rules have been subtly changed. It used to be prohibited to damage the trees in the park. Now it is prohibited to "disturb" the trees. I wonder if a tree is disturbed if I throw a line over one of its branches to pull up an antenna?

During a recent POTA activation I attracted the attention of a Conservation officer. I wrote about it here. He saw me sitting in my truck doing suspicious stuff (sending Morse Code). My hitch-mounted vertical antenna was sticking up about 13 feet above ground. I explained what I was doing in a cheerful, helpful tone and he left looking puzzled, probably still wondering whether what I was doing was a "prohibited activity".

On another POTA activation somebody pulled up behind me and, looking at the same hitch-mounted vertical antenna, inquired what I was listening to. I gave him a very simplified précis of the Parks On The Air program and he too left looking none the wiser.

I recall another incident a few years ago when I was operating in a RaDAR (Rapid Deployment Amateur Radio) event. I was parked at a trailhead with a long vertical antenna tied to a fence. Two lady hikers were coming off the trail and I heard one of them say in a loud, aggressive voice, "well I'd like to know what's going on here!".

I have often wondered what kind of response I would give if told that operating a radio is a prohibited activity. One option might be to politely inquire whether the prohibition extended to cellphones too. I doubt the average person would understand that a cellphone is really a 2-way radio. My "phone" actually contains several radios; cellular, Wi-Fi, Bluetooth and GPS.

Would it help if I showed a suspicious official my ham licence? I doubt it. Canadian ham licences are very unconvincing. For a start it is not actually a licence. Mine is a flimsy piece of paper entitled "Certificate of Profiency in Amateur Radio", issued by a government department that no longer exists.

So for me the best strategy is to remain unnoticed. Although I don't mind being an ambassador for the hobby I don't always want to be disturbed by curious passers-by. I might be working a pile-up or trying to dig a weak DX station out of the noise. Better not to be seen, or at least, not look suspicious.

I prefer to operate stealthily. My radio kit is painted in nice "woody" colours; shades of green and brown. I use mil-spec "ammo" bags for my bits and pieces. My man-pack sits snugly inside a NATO rucksack. When I took my field radio equipment for a show-and-tell at a recent club meeting the first reaction I got was "it looks very military".

Well yes, it does look vaguely military. The military and I share similar needs. We both want to be stealthy, for somewhat different reasons, and we both want gear that is rugged and durable. Heavy cotton canvas equipment bags with metal fasteners may not be the height of fashion but you only have to buy them once.

There is a potential downside to being stealthy though. It is important not to look furtive. Keep a low profile but act boldly. Create the impression that you belong, that you are engaged in an authorized activity. Don't let them see any feelings of guilt you might have. You probably won't be challenged if you wear a high visibility jacket, a hard hat and carry a clipboard and handheld radio!

The handheld radio alone is a badge of authority. I used to write a monthly column for a hobby radio magazine. I was putting together an article about airshows and visited a local one where the Canadian Armed Forces Snowbirds aerobatics team were doing a display. The whole team's aircraft were parked beside the runway before the show.

I wanted to get some close-up shots of one of the aircraft for my article. Clutching my old Icom handheld transceiver prominently in front of my face I boldly marched through a gap in the security fence and grabbed the images that I needed. Nobody challenged me.

Hey, I'm almost getting confident about this stealthy but bold business. As the old saying goes: "Softly, softly catchee monkey".

~ John VA3KOT

"None the wiser"

My NATO Rucksack

John VA3KOT resides in Owen Sound, Ontario but is more often found operating CW out in the "Big Blue Sky Shack". He especially enjoys activating parks for the POTA program and blogging about his experiences at HamRadioOutsidetheBox.wordpress.com

What Do VHF and UHF Mean?

Bob maintains a great blog site at https://www.k0nr.com/wordpress/.

Contact Bob at bob@k0nr.com.

You can also check out his book VHF, Summits and More: Having Fun With Ham Radio.

Recently, I engaged in a discussion about a UHF (Ultra High Frequency) radio. It seems a ham was complaining that someone had advertised an 800 MHz radio, describing it as "UHF". His issue was that in land mobile radio, UHF is commonly used to refer to radios in the 380 to 500-ish MHz range. I disagreed with him, saying that 800 MHz is in the UHF range. I was using the ITU definition of UHF, which is any frequency between 300 MHz to 3 GHz. The disagreement was not a big deal but it did cause some confusion. (Of course, I was right and he was wrong, most definitely.)

This got me thinking about how we toss around these terms quite loosely, even though they have precise definitions. Let's start with the basics, the ITU definitions of radio spectrum as shown in the table below.

LF	Low Frequency	30 kHz to 300 kHz
MF	Medium Frequency	300 kHz to 3 MHz
HF	High Frequency	3 MHz to 30 MHz
VHF	Very High Frequency	30 MHz to 300 MHz
UHF	Ultra High Frequency	300 MHz to 3 GHz
SHF	Super High Frequency	3 GHz to 30 GHz

You can see that the basic scheme divides up the spectrum into decades (factors of ten), aligned with frequencies that start with 3 (e.g., 3 MHz, 30 MHz, 300 MHz). If we map the amateur bands onto this system, we see that the bands from 80m (3.5 to 4.0 MHz) through 10m (28-29.7 MHz) fall into the HF range, as expected. Note that 10m almost qualifies as a VHF band, coming in just shy of the 30 MHz limit. That band does have some VHF tendencies. The 160m band (1.8 to 2.0 MHz) actually falls into the MF range even though many of us just think of it as HF.

Let's take a look at how the US *[and Canadian]* amateur bands line up with this scheme *[table next page]*.

There are three VHF bands:

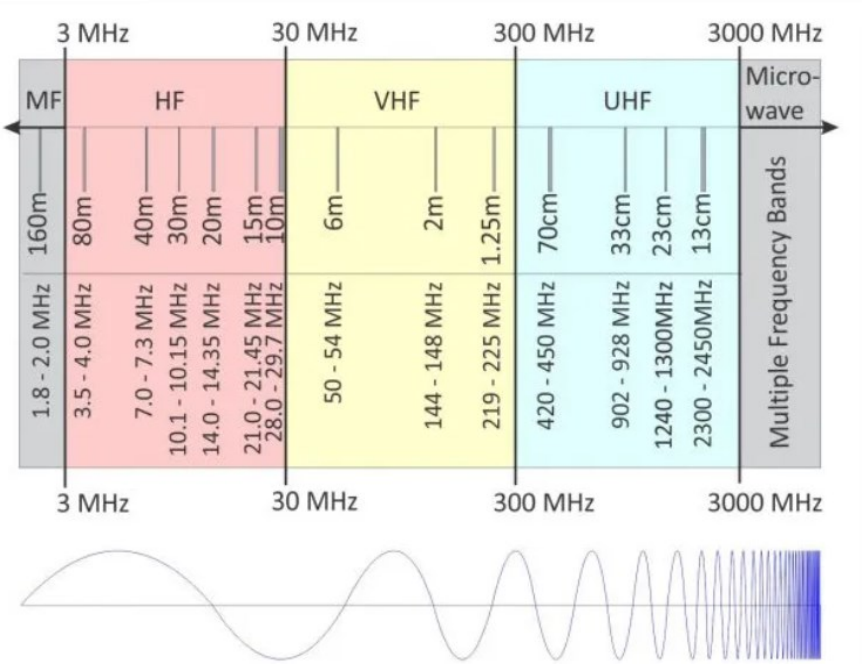
- 6m (50 to 54 MHz)
- 2m (144 to 148 MHz)

- 1.25m (222 to 225 MHz)
  [an additional 219-220 MHz to be addressed in a new bandplan in Canada—Currently has secondary status].

The UHF range includes

- 70 cm (420 to 450 MHz)
  [430-450 MHz in Canada]
- 33 cm (902 to 928 MHz)
- 23 cm (1240 to 1300 MHz)
- 13 cm (2300 to 2450 MHz) bands

The two most commonly used bands in the VHF/UHF region are 2m and 70cm. These bands are home for many FM repeaters, FM simplex, SSB simplex, and plenty of other modes. Common dualband transceivers, both mobile and handheld, operate on the 2m and 70cm bands. These radios are so common that we often refer to them as VHF/UHF dualband radios. Accordingly, you will often hear hams refer to the 2m band as simply VHF and the 70cm band as UHF, as if VHF means 2 meters and UHF means 70 cm. I know I've been guilty of saying "let's switch over to VHF" when I really mean "let's go to the 2m band." The 2m band is certainly VHF but VHF does not always mean 2 meters. Similarly, we might say "I'll call you on the UHF repeater" when it would be more precise to say "I'll call you on 440 MHz."



Many times being loose with terminology doesn't matter but there are times when using the right words can make a difference. Think about this the next time you are referring to a particular frequency band.

~ 73 Bob KØNR

This book is an easy-to-understand introduction to VHF/UHF ham radio, including practical tips for getting on the air and having fun messing around with radios. Learn about FM, SSB, repeaters, equipment, band plans, phonetics, portable operating, Summits On The Air (SOTA) activations and more.

Thomas Witherspoon K4SWl / VY2SW

QRPer.com

After returning from Canada this summer, I had a number of projects on the table including three radios to evaluate and a number of DIY projects on our investment house. The home projects took priority, so for the month of August, I did very little in terms of POTA activating.

In September, there was one radio in particular I was very eager to take to the field (besides the Penntek TR-45L). That was my Elecraft KX1, "Ruby."

Before leaving for Canada, Ruby went into surgery once again under the care of my good friend "Dr." Vlado (N3CZ).

I couldn't figure out why she kept dropping power output to nil after being on the air for 20-25 minutes. I knew Vlado would sort out the issue.

Vlado discovered the source was a cold solder joint that was failing when the radio would become warm from operating. He fixed this and checked a number of other spots on the board.

He then tested the KX1 on a dummy load for and hour and she performed flawlessly after the surgery.

He fixed Ruby in early June and then we went to Canada for two months. I never put Ruby on the air in Canada.

After our return to the States, I was eager to take Ruby out to the field again and that's exactly what I did on Sunday, September 11, 2022.

Lake James State Park (K-2739)

Lake James State Park–along with South Mountains State Park–are the easiest parks for me to hit during my nearly weekly travels on Interstate 40. I feel so fortunate that both are superb POTA sites with loads of spots to operate.

I arrived in the late afternoon and to my surprise there was hardly anyone at the park (I think it was a little too close to evening mealtime for families).

I set up my station at a table close to the parking area just to keep things simple. I was looking forward to enjoying at least 30 minutes on the air and seeing just how well Ruby might hold up.

I decided to use the Tufteln End-Fed Random Wire antenna knowing it would be a quick to deploy and frequency agile.

I tried to use the KX1 ATU to tune the random wire, but I wasn't pleased with the SWR. Frankly, it was doable (1.9:1 on 20 meters), but I wanted something much closer to 1:1 since I was already only pushing 2.5-3 watts output.

Keep in mind, the KX1's internal ATU is not in the same league as the ones in the Elecraft KX2, KX3, or T1–the KX1 ATU has a much smaller matching range.

Also, I suspect Ruby's ATU wasn't built for optimal performance by the original builder. I do plan to re-work her ATU as best I can at some point in the future.

I pulled out the Elecraft T1, put the KX1 ATU in bypass mode, and hooked it up to the antenna. The T1 had no problem at all finding 1:1 matches across 40, 30, and 20 meters, of course.

Gear

- Elecraft KX1 Field Kit
- Pelican 1060 Weatherproof Case (affiliate link)
- Sony SRS-XB12 portable wireless speaker (no longer produced–eBay search)
- Elecraft T1 ATU
- Tufteln Elecraft T1 case
- TufteIn EFRW QRP Antenna Long Wire
- CW Morse CNC Machined Aluminum Paddle
- Spec-Ops Brand T.H.E. Pack EDC
- Camera: OSMO Action Camera with Joby tripod (affiliate links)

On The Air

I started calling CQ POTA on 20 meters hoping to catch a few west coast stations as the sun started setting.

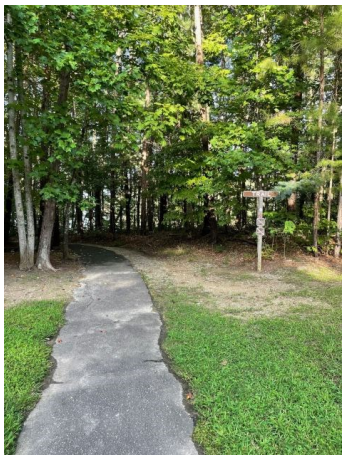
Within 13 minutes, I worked the ten stations needed to validate this activation. I worked an additional four stations in 6 minutes on 20 meters, then QSYed to the 30 meter band.

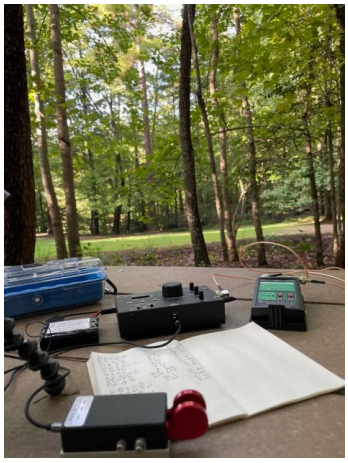
30 meters was hopping! I worked station after station–15 stations in fourteen minutes. I was very pleased.

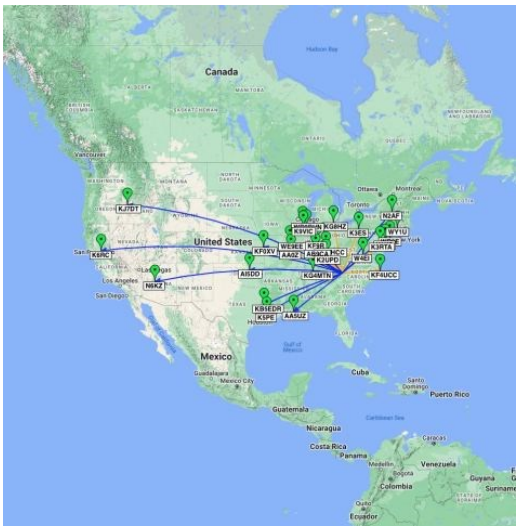
I would liked to have continued the activation, but I needed to grab dinner and move on to my next destination.

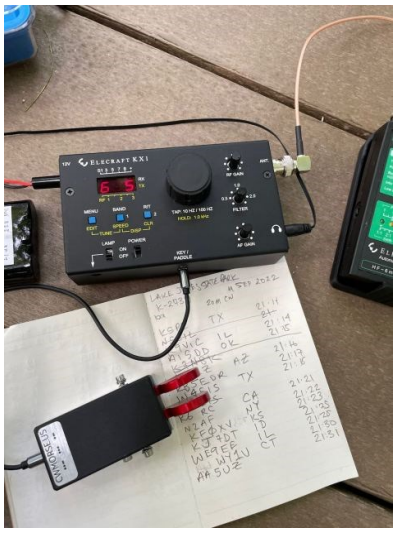
Activation Video

Here's my real-time, real-life video of the entire activation. As with all of my videos, I don't edit out any parts of the on-air activation time: https://youtu.be/n1NHdnaBI0A









Here's what this 3 watts or less activation looked like when plotted out on a QSO Map

Good check up

I was very pleased that my little KX1 held up during this activation. I took Ruby on another activation in September, so you'll see that activation and field report soon, too.

As I've said before, I have a small obsession with the KX1 and really do want to have one in full working order at all times. I suspect tweaking and repairing Ruby will be a pretty constant thing, though, as more cold solder joints and other issues potentially appear. I do plan to completely re-work all of the solder points that I can this winter.

~ Thomas (VY2SW / K4SWL)

Reprinted with permission of the author. Please visit Thomas' page to comment and to view more photos: https://qrper.com/2022/08/fighting-mozzies-and-logging-pota-hunters-at-cap-touremente/

100 Years of Amateur Radio Transatlantic Communications

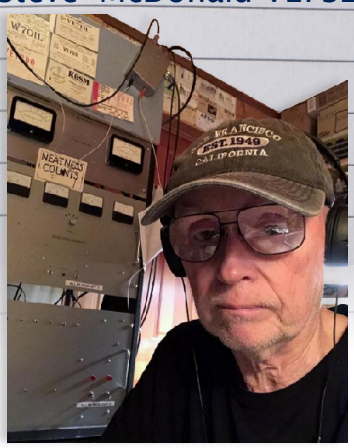
On December 24, 1922, the first-ever verified amateur radio signal from Europe was heard in North America as part of the third transatlantic test. This was from the RSGB station (G)5WS, based in Wandsworth in South London.

The RSGB has organized an international radio event on the HF bands during the month of December 2022: **'The Transatlantic Centenary Tests'**. In doing so, it commemorates the centenary of the transatlantic success of the RSGB in December 1922. RSGB members and clubs will activate special callsigns and there are fun awards to be had. More information on how to participate can be found on the RSGB website: https://rsgb.org/main/activity/transatlantic-tests/

VE7SL's Radio Notebook

Building a 1930's regenerative receiver

Steve McDonald VE7SL



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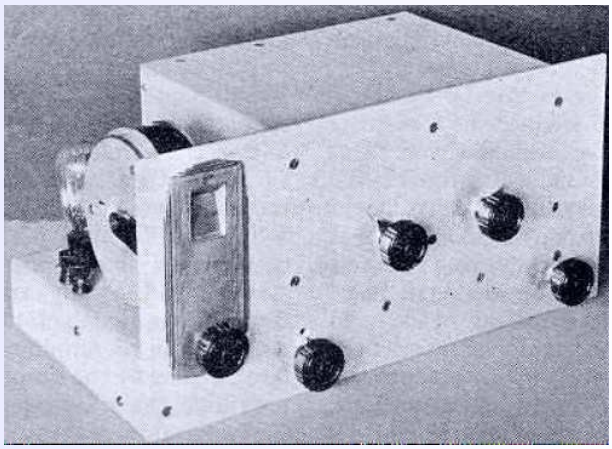
The design for this receiver was first published in the January 1933 issue of QST. In an article by QST's Assistant Technical Editor, George Grammer, "Rationalizing The Autodyne", the author promised "*A Three Tube Regenerative Receiver of Unusual Performance*". The term 'autodyne' simply refers to the oscillating state of the regenerative receiver. When it is oscillating, it is in the 'autodyne' mode.

I've always liked the building styles seen in the '30's and having built just one regenerative receiver previously (the receiver-section of my Paraset), I found this design intriguing. With the receiver's ganged-tuning scheme and well-shielded stages, it looked like a challenging project for the summer workbench.



Schematic

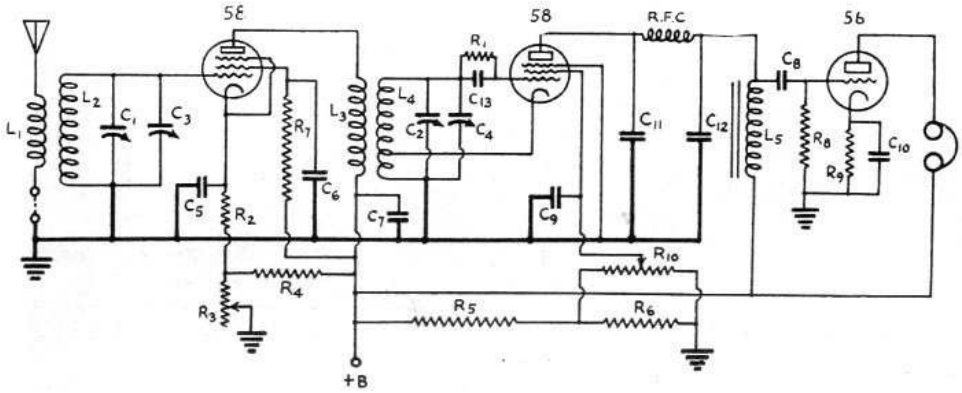
An examination of the schematic *[next page]* doesn't show anything too unusual other than the tuned RF stage in front of the regenerative detector. Closer examination of the physical layout however, reveals that the front-end RF stage tuning is mechanically tracking the oscillator-stage tuning so that once set up for a given band there really is nothing to fiddle with, other than leisurely tuning across the band… which, because of the low-valued variable capacitor, is generously spread out across most of the large drum dial.

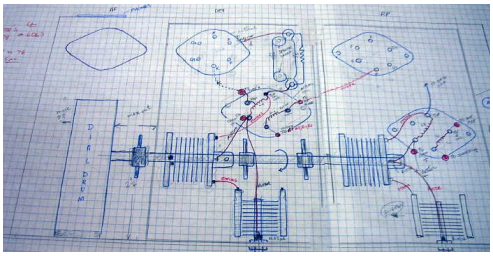
Planning

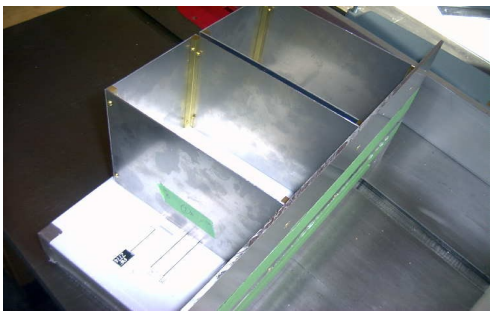
Before starting construction, a full-sized plan view of the receiver was drawn so that parts placement and optimum wiring paths could be planned.

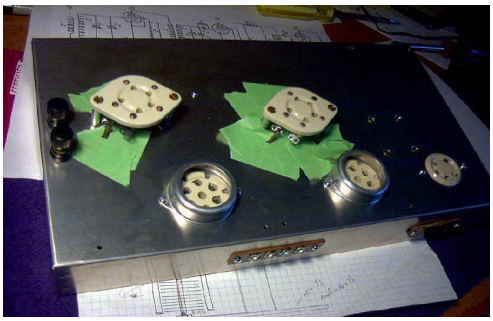
Plans

The small photographs in the original article made it difficult to see exactly how things were wired, but by the time I had completed my own plan, I was pleased to see that it looked very similar to what pathways I was able to make out in the original photos.









Building

Shields

Construction began by building the two shielded compartments. The 'scraps' table of the nearest Metal Supermarket provided the 20 gauge aluminum (still in protective covering) along with the 1/4" square brass bar stock needed for the corners. All of the holes drilled in the brass corner pieces were tapped to accept 4-40 brass screws.

Panel

The front panel was cut from a large sheet of 1/8" aluminum sheet that had been purchased several years earlier. The 1933 chassis (7 1/2" x 13 1/2" x 2") was built by Grammer and the only aluminum ones available today are slightly smaller (7" x 13" x 2") in length and width… things would be fitting a little tighter.

Sockets

The pre-made full-size plan helped a lot when it came to positioning and punching holes for the tube and coil sockets.

Caps

All of the required variable capacitors (four) were found on e-Bay, all NOS, and surprisingly inexpensive. Perhaps the gradual decline in homebrewing old radios and transmitters has led to fewer demands for many of these older components.

Most of the other components (resistors, fixed capacitors, pots etc) were found in my junk box collection but several of the capacitors were 'manufactured' by re-packing modern ones into some original era-appropriate cases.

Bus

Wiring began by working from left to right, following the schematic. Grammer had expressed the importance of making sure that all of the grounding points for the RF portions of the circuit be made at a single point… this even included the grounded rotor sections of the variable capacitors! Rather than do this, I ran a heavy silver wire buss bar across the chassis and brought everything that needed RF grounding to the buss.

The Communicator

Wiring

The ground buss allowed for a cleaner-looking, less 'rat's nest' appearance, than the original seemed to have. Grammer also gave the builder a choice of using 2.5V or 6.3V tubes and I chose the six-volt variety... 78's (RF and Detector) and a 76 (Audio). As well, six-volt 6D6's can be substituted for the 78's while a 37 can be subbed for a 76.

I made just one modification to the original schematic and that was to convert the audio stage to impedance-coupling so that the high voltage (200VDC) would not appear across the headphones. The circuit for the new audio stage is shown below.

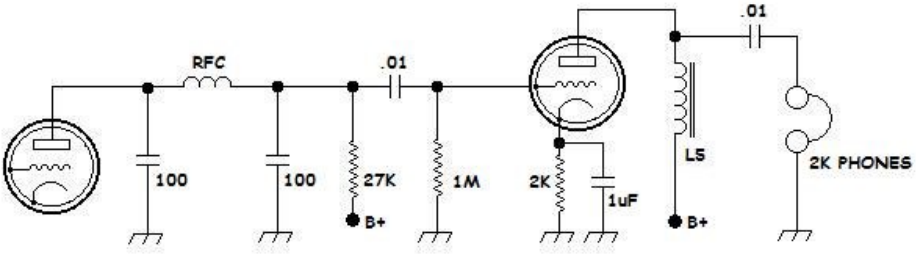
New A.F. stage

The high-value choke specified in the original plan for the A.F. stage is fairly difficult to find nowadays. I substituted a normal power supply choke of about 10H which seems to work just fine… the audio stage puts out more than enough to drive my high-impedance Baldwin headphones and in normal operation, the volume control is barely cracked open. Other regen experimenters have found good success using just one or more windings of a common audio transformer. I found one winding of a small speaker transformer pulled from a very old car radio, worked just great in the audio stage of my Paraset. If you're building a regen, just try what you have and don't worry too much about locating the exact specified part.

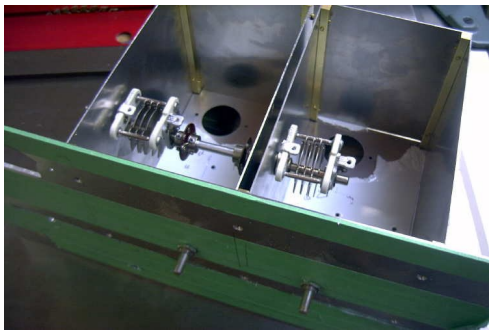
The coils were wound to exact specifications and on original Hammarlund forms. I have a number of these in the junk box, most with many holes drilled decades ago. I've found that the holes can be easily filled with two-part wood dough and then color-matched to the original form's shade using wash coats of acrylic paint… the old holes become almost unnoticed once the forms have been waxed, buffed and wound once again.

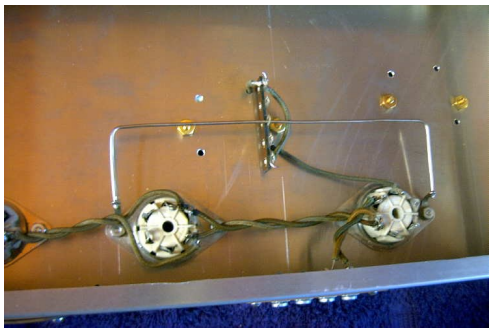
40m coils

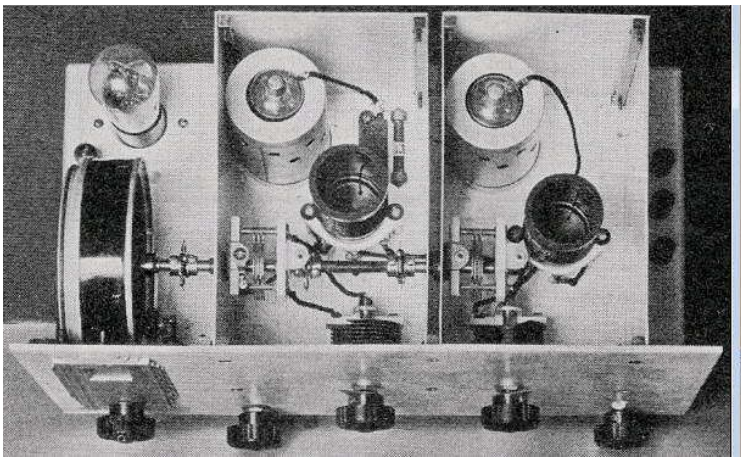
Building Grammer's autodyne was just one of my 'summer projects'… most of them being outdoor maintenance jobs, including the re-shingling of the garden-shed and the wood-shed.

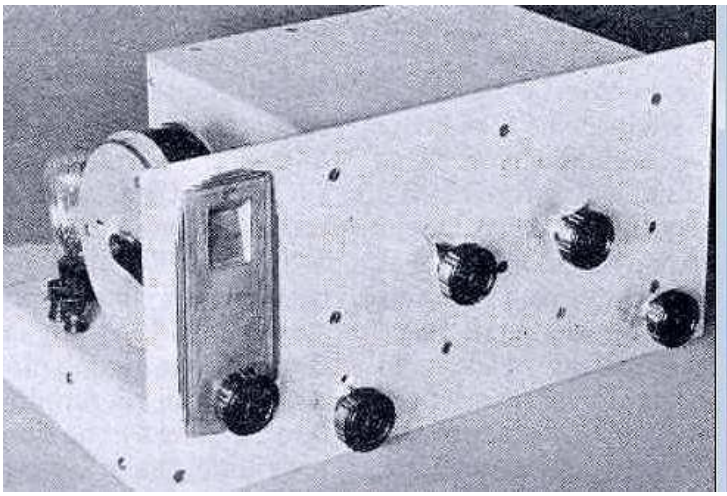


IMPEDANCE-COUPLED AUDIO STAGE










Because of the outside jobs, construction progressed slowly and was spread out over a ten-week period but… eventually it was finished!

Testing

I usually have a 'gut-feeling' of whether a project is going to work immediately or if there is going to be a lengthy period of trouble-shooting ahead. For this project, it was the latter, as there were just too many reasons why things might go wrong. From the hand-wound coils to many of the old components (would they still be up to the job?) as well as the old tubes… one of my junk box 78's had a big red question mark painted across the glass, not exactly encouraging.

With much trepidation, I held my breath and… connected the filament voltage and then B+…

Very much to my surprise and delight, the receiver immediately came to life! I was delighted that a long trouble-shooting phase would not be needed. It took some time for me to get the feel of the controls and what levels were best… in fact my first impression was that the receiver, although working, was not working as it should. I found that the RF stage would generate noise if the gain was set too high. This was soon cured by swapping the questionable 78 out of the RF stage and into the detector. Finding the best balance between the RF gain and regeneration was eventually figured out

and I can say that the receiver is working extremely well.

It is difficult to know just what constituted 'good' performance in 1933 as these older designs cannot be compared with anything modern… there is just no comparison to today's radios. The only other regenerative I could compare it with is the National SW-3 (made in the early 30's as well) and the regenerative receiver in my Paraset.

Comparing it with my SW-3, possibly one of the best regenerative receivers of its day, selectivity and smoothness of regeneration are pretty much equal. Both receivers are equally sensitive, at least on 40m. Audio output levels of both receivers are the same, with lots of audio from the new receiver. Compared to my Paraset, which uses a much newer and hotter tube (6SK7), both the Paraset and the SW-3 are about equal… so it would appear that the new receiver is performing very well. The one place that Grammer's receiver beats out the other two is in oscillator stability.

His design is very stable and SSB signals are easily tuned and stay in tune, when testing on 40m. Because of the tuned RF stage, there is no bleed through of high-powered shortwave broadcast signals just up the band… a common problem of simpler regens. As well, once the regeneration level is properly set and the RF stage is peaked, no further adjustments are needed when tuning across the entire band… the receiver is a real delight to use and I can see why it was so popular in the early 30's.

Overall I have been very pleased with the outcome of this project. It is very faithful to the original plan and I believe the receiver is performing as well as Grammer originally intended. I think that most amateurs in the early 30's would have been delighted to have had this receiver on their operating table.

~ *Steve VE7SL*

Click here for a RECORDING using the new regen … made on a noisy August evening on 40m CW

With Varying Frequency

Amateur Radio Ponderings

Steve Weinert K9ZW

Is your radio vulnerable to outside control?

To what extend are your really in control of your radios?

Can someone else control them, perhaps shutting them down or limiting what you can do with them?

In our IoT (Internet of Things) world things are open to purposeful and inadvertent control.

Some examples:

A 2022 Military Action event:

"As Russian troops invaded Ukraine, alleged Russian military hackers targeted the Via-Sat satellite system, deploying wiper malware that bricked people's routers and knocked them offline. Around 30,000 internet connections in Europe were disrupted, including more than 5,000 wind turbines."
– *Wired, 18 AUG 2022*

A boo-boo car issue:

"They drove a 2014 to 2017 model Mazda, and they had tuned into KUOW, 94.9 on the FM dial, the NPR station. That's all it took.

Somehow the signal the station sent to the modern HD Radio that's part of the Mazda infotainment center had, as Welding puts it, "fried" a major component.
That frying made the radios only play KUOW. No chance of catching a little classic rock or some Dori soliloquies. KUOW. Forever.
Also gone from the infotainment center were such features as Bluetooth, navigation, the clock and vehicle stats — "Many of the features I paid for when I bought it new," Welding says."
– *Seattle Times, 11 FEB 2022*

A personal one:

The XYL's EV needed updating, done over the air. Update went well until two weeks later when about half of the "nice to have features" suddenly stopped working, putting the vehicle into a "basic mode" where it does drive and charge, but not much else. Dealer and Manufacturer have the "Top Men" working on it as I type.

A computer one:

> …we learned via Microsoft's Raymond Chen that back in the olden days of Windows XP, it was discovered that a music video of a song called Rhythm Nation by Janet Jackson was causing Windows PCs to crash. This is because the song in question contained resonant frequencies for 5400RPM hard drives which even crashed PCs in vicinity while the song was being played.
> While OEMs eventually fixed the issue, security agency MITRE has now declared it as an official exploit. – Security Discussions online and Tom's hardware https://www.tomshardware.com/news/janet-jackson-video-crashes-laptops

A radio one:

> If Microsoft Azure servers have an issue, or the Auth0 security part gets jiggled my remote station is DOA.

- So what if your radio is set up to shutdown on receipt of a certain signal?
- Or could be controlled by something through its internet connection?
- What do we control and what is controllable by others?
- What if the services that are needed to run your station disappear?
- Is there any workaround when services are disrupted?
- What happens if the support goes away or is abandoned?
- Pretty fair questions that likely are not completely answerable.
- It doesn't make sense to forego all modern-conveniences to avoid the exposures.

But you should have a "Plan-B" in mind.

One strategy is to keep a set of radio gear that is old enough and simple enough to sidestep the exposure.

~ Steve K9ZW

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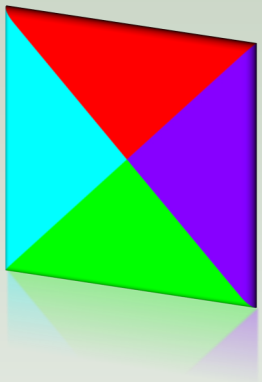
Social Reminder

The Saturday weekly social gathering is once again 'on' at the Denny's Restaurant, 6850 King George Blvd., Surrey BC from 07:30—09:30. All are invited. Afterwards, we will host workshops and will be available to invigilate Amateur Radio exams at the OTC, 5756—142 Street, Surrey from 10-noon.

Bring your ham issues, our Elmers will try to help you sort them out.

Foundations Of Amateur Radio

Onno Benschop
VK6FLAB



Smith, the chart to end all charts ...

To listen to the podcast, visit the website: http://podcasts.vk6flab.com/ . You can also use your podcast tool of choice and search for my callsign, VK6FLAB.

Full instructions on how to listen are here: https://podcasts.vk6flab.com/about/help

In the time that I've been a radio amateur not a day has gone by without learning something new. Today was no different and this time learning took me both by surprise and delight. I realise that being delighted by charts, since that's what we're talking about, might not be something that comes naturally, but I can highly recommend that you use this as an opportunity to explore.

So, which specific chart am I referring to?

The venerable Smith Chart, something which I've seen from a distance many times in the past decade, but never actually understood, or to be honest, even looked at with anything more than a glance and a shudder.

My first exploration started with a book published in 1969 by the person who developed the chart, Phillip Hagar Smith, an electronics engineer. The book, over 250 pages, is dense and frankly my reading of the first part of the book did not fill me with delight, but based on what I discovered afterwards, I might revisit it.

The purpose of the Smith chart is to visualise complex mathematical relationships. Instead of filling your worksheet with a litany of calculations, you can draw lines, circles and read the answer straight off the chart.

For example, given the impedance of an antenna system, determining the standing wave ratio becomes a case of putting a dot on a chart, drawing a circle through the dot and reading the VSWR straight off the chart.

It gets better.

If you have a digital Smith chart, like the one shown on a NanoVNA or a RigExpert antenna analyser, you can read the antenna impedance in relation to frequency, use a tuner to change it and see the chart update in real-time in direct response to you changing inductance or capacitance by twiddling the knobs on the tuner.

One of the main things that a Smith chart solves is to visualise a chart

with infinity on it, twice. In radio a short-circuit is one extreme and an open-circuit is another. Coming up with a way to show both those conditions on the same chart is a stroke of genius.

The chart has evolved over time, but in essence it's a circle with an amazing set of arcs drawn throughout. The very centre of the chart has the number 1.0 next to it. That's the point at which the VSWR is 1:1, the reactance is zero and it's called the prime centre. A dummy load should show up as a dot in that spot, regardless of frequency.

The Smith chart is normalised. It doesn't matter if you're using a 50 Ohm or a 75 Ohm antenna network system, the middle of the chart is 1.0. Follow the horizontal axis to the right and you'll discover 2.0, that represents twice the resistance. If you're using a 50 Ohm system, 2.0 represents twice that, or 100 Ohm. Go to the left, find 0.5 and that represents half, or 25 Ohm. The far left point on the horizontal axis represents zero Ohm, or a short circuit, the far right represents infinite resistance, or an open circuit.

Positive reactance, or inductance is shown above the horizontal line, negative reactance, or capacitance is shown below the line.

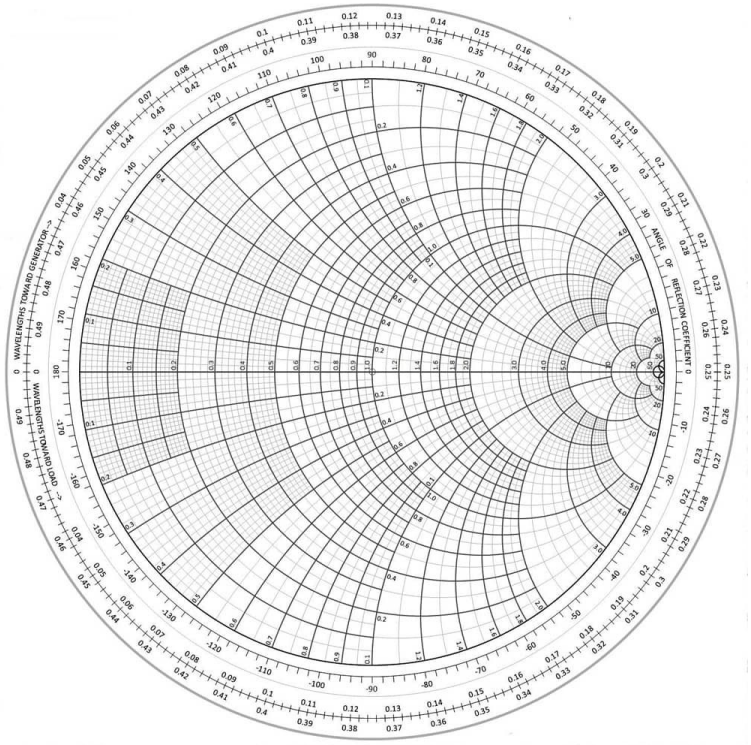
Going back to the middle of the chart, you'll discover a circle. All along that circle the resistance is the same, that is, on a 50 Ohm system, all of that circle represents 50 Ohm. If you look directly above the prime centre, you'll discover another 1.0 on the edge of the chart. The arc coming from that point represents an inductive reactance of 50 Ohm all along its path. Similarly, at the bottom of the chart you'll see an arc coming from a 1.0, representing the capacitive reactance.

Before you pack it in with all this inductive and capacitive reactance, think of it as another attribute of your 50 Ohm antenna system. You don't need to precisely know how it works in order to use it.

Remember how I mentioned that you could just read off the VSWR from the chart?

Drop a point on the chart, anywhere is fine. You can read off both the resistance and reactance following the two arcs through that point. If you draw a circle through the same point with the centre at the middle of the chart, the VSWR of that system is the number that you can read, where your circle crosses the horizontal axis.

Before I go, there are plenty of YouTube videos on the topic, but there are a few that I'd recommend you explore. Among an amazing array of RF educational videos, Rhode and Schwartz made a ten minute presentation called "Understanding the Smith Chart" which walks you through how to read the chart and you don't need the prerequisites to follow along. In Part two of his "Smith Chart Basics" series, Carl Oliver shows how to look up the VSWR in three easy steps and Alan W2AEW has several videos showing the chart in action with several vector network analysers or VNAs and I'd recommend that you look at videos 264 and 314 to get started, but there's plenty more of his handy work to explore.



All podcast transcripts are collated and edited in an annual volume which you can find by searching for my callsign on your local Amazon store, or visit my author page: http://amazon.com/author/owh. Volume 7 is out now.

Feel free to get in touch directly via email: cq@vk6flab.com, follow on twitter: @vk6flab or check the website for more: http://vk6flab.com/

If you'd like to join a weekly net for new and returning amateurs, check out the details at http://ftroop.vk6flab.com/, the net runs every week on Saturday, from 00:00 to 01:00 UTC on Echolink, IRLP, AllStar Link, IRN and 2m/70cm FM via various repeaters.

If you'd like to participate in discussion about the podcast or about amateur radio, you can visit the Facebook group: https://www.facebook.com/groups/foundations.itmaze

This podcast episode was produced by Onno (VK6FLAB). You can find more at http://vk6flab.com/

If you take away anything from this, it should be that the Smith Chart isn't scary, there's just lots of stuff there, but spend a few minutes looking at it and you'll discover just how useful it can be in your day to day amateur antenna tuning adventures.

If you've come across other interesting resources on the topic, don't hesitate to get in touch.

~ I'm Onno VK6FLAB

Setting a little personal challenge ...

A week ago I unexpectedly had my gallbladder removed. As emergencies go, I was lucky to be in a major metropolitan area with a remarkable hospital, supported by a group of humanity whom I've never much interacted with in my life. The staff at Sir Charles Gairdner Hospital were without exception amazing, from the orderlies to the nurses and everyone behind those, I interacted with about fifty people directly during my stay and every single person had a smile to share and an encouraging word to give. As life experiences go it was as uplifting as I've ever had the opportunity to celebrate. Sure it hurt like hell and there were things I'd rather not have to try again, but on the whole it was, if not pleasant, at least memorable. Recovery is going to take a little while and I understand my voice is expected to return to normal in a few weeks having been intubated for most of a day.

Half an hour after being discharged from my five days in hospital I was faced with a choice. Produce nothing for my weekly contribution to our hobby and face the risk of an astronomical bill from my hosting provider because the script that I wrote didn't foresee that there might be a time when I was unable to provide content, or produce something that, to be sure, was lacking in every way, but at least know that there wouldn't be a surprise waiting on my bank statement next month. So, my inadequate production saw the light of day. For that I apologise, it should have been silence.

During the week I returned to my shack and had a look at my beacon. As you might recall, I've been using Weak Signal Propagation Reports, or WSPR in my shack for a while. According to the logs the very first time was in November of 2017. At the end of last year I took delivery of a ZachTek desktop WSPR

transmitter which has been reported on air over 16 thousand times since. I've only been using the 10m band and it's been heard as far away from me in Western Australia as the Canary Islands, the home of Johann EA8/DF4UE and Peter EA8BFK who between them reported my signal nearly 90 times. It's remarkable to note that this is a distance of over 15 thousand kilometres, on the 10m band, using only 200 mW.

During the week I made another milestone, a report in the opposite direction, across the Pacific Ocean to mainland USA. While that didn't break any distance records, it was a thrill to see a report from the Maritime Radio Historical Society, logging WSPR signals using KPH.

Other things to note about these reports are that its been heard across 81 different grid squares, by 144 different stations from all directions of the compass.

During my hospital stay and since, I've come to appreciate setting little goals. Little personal achievements that in and of themselves are not meaningful to anyone but me, and in some cases, my medical support team. It reminded me of a time when I attempted to achieve this in amateur radio, making a contact every day. Looking back over my logs I can tell you that I've not managed to maintain that, though, technically, on average, given that I host a weekly net and there's generally more than seven people who join in, I could claim an average of one QSO per day, but both you and I would know that I was stretching the truth somewhat.

It occurred to me that my signal report by KPH could be considered the beginning of my new 10m adventures. Much of my start in this hobby was during the previous solar cycle and the 10m band featured heavily in much of my activities, especially since you can get on that band with the very minimum of antenna, a quarter wave on 10m is a 2.5m whip and that can fit even on my car and it did, for years.

When the solar cycle eventually wound its way down, the 10m band was quiet for much of the year with the odd spot to whet your appetite, but rare enough to have little in the way of ongoing contacts.

As far as I'm concerned, 10m is back in play and it's my personal special band, so I'm setting myself a little challenge for the month of November and you can join in, open to anyone who wants to play. There's no prize, no scoreboard, no accolades, no nothing, other than the personal satisfaction of achievement.

Here's the challenge. How many kilometres per Watt can you achieve during November? To explain, my beacon uses 200 milliwatts, so any distance is multiplied by five to get the km/W number. If you use more than a Watt, you'll need to divide your distance by the number of Watts you use. As I said, this is a personal challenge. I'm not going to adjudicate, there's no rules to break, no one to tell you that you're cheating, it's just between you and your WSPR beacon.

For now, my record is 75630 km per Watt. I'm going to take the opportunity to consider what I might do to improve on that. Perhaps if I reduce power I'll still be heard in the Canary Islands, but I'll have more bang for my buck. Time will tell. Feel free to share your own achievement, or keep it to yourself, entirely up to you.

In case you're wondering about the capacitor thing, a gallbladder is like a bile capacitor, the analogy came from a story I wrote whilst in hospital, it might even see the light of day...

~ I'm Onno VK6FLAB

KB6NU's Column

Dan Romanchik, KB6NU

Meters or MHz?

n something that I wrote recently, I referred to "70 cm repeaters," meaning, of course repeaters that operate between 420 MHz and 450 MHz (at least here in the United States). One of the reviewers took me to task for my use of this phrase, writing:

Another thing that amateur radio gets wrong is the use of terms like 70 cm. WE old hams know what that means, but there aren't any radios that display a frequency in cm, so in my opinion, it's best to spell out frequencies and not wavelengths. To rewrite this, I'd say, "440 MHz repeaters" instead.

While I see his point, I'm not so sure that he's right about this. Back in the day—and I'm talking the 20th century here—we used to call the 70 cm band, the 440 band (at least here in the Midwest). Note that we'd say "440" and not "420," because most, if not all, the repeaters were located at the top end of the band.

Now, however, I think it's becoming more common to hear 70 cm instead of 440 MHz. Why call that band 440 MHz when we refer to all that other bands—at least all those lower in frequency—by their wavelengths? What I suggested is that I re-word "70 cm repeaters" to read "70 cm-band repeaters" or "repeaters for the 70 cm band."

In his reply to this suggestion he wrote:

To each his own, I guess. In my writing, I'm trying to make amateur radio seem accessible and inclusive to those who aren't currently hams, but might be interested. I'm not trying to "dumb it down"—my intended audience is techies—but I think that one only understands wavelength measurements once you're on the inside of amateur radio. To a non-ham it's cryptic to say 70 cm; non-ham wireless experimenters are used to seeing 433 MHz, 900 MHz, so that's why I use frequencies, not wavelengths.

I think that perhaps what I'll do is to continue to refer to the band as the 70 cm band when writing for amateurs, but be more specific when I think that non-amateurs will be part of the audience. For example, I might refer to "repeaters operating in the 70 cm band (420-450 MHz)."

~ *Dan KB6NU*

When he's not trying to figure out which way current flows, Dan blogs about amateur radio at KB6NU.com, teaches ham radio classes, and operates CW on the HF bands. Look for him on 30m, 40m, and 80m. You can email him at cwgeek@kb6nu.com.

Ham Leftovers...

Reverse Beacon Network made easy with the Icom IC-7300

Bruce Bittenbender, K3BBB, suggested I look at how easy it is to use the Reverse Beacon Network (www.reversebeacon.net and https://youtu.be/jBO_EjHAkW8) with the Icom 7300, 7610, etc. You can use this worldwide network to see how well your signal is heard, test antennas, and so forth. Fun!"

VU meters

While we are all interested in sending great quality video as our goal as ATVers. We also need to be concerned about the quality of our audio. One of the tools for measuring our audio levels is the VU meter. Mick, VK3CH, has a great article covering all aspects of VU meters and measuring audio signals. It is found in the latest October, 2022 issue of the NEVARC-NEWS. Available in .pdf format to be down-loaded from: www.nevarc.org.au

How to pack a 'Go' bag for climate disasters

Climate change-fueled natural disasters, from wildfires to floods, are affecting more North Americans every year. Many people are caught off guard by emergencies in their communities, but there are ways to prepare that can help you protect your life and health when the worst happens.

One way crucial step is to have an emergency go bag, or go kit. This is typically a backpack or duffle bag that is filled with essentials for staying safe if you have to quickly leave your home. Learn more at: https://gizmodo.com/how-to-pack-a-go-bag-climate-disasters-wildfires-floods-1849457027

Neon lamps... Not just for pilot lights

It's easy to see why LEDs largely won out over neon bulbs for pilot light applications. But for all the practical utility of LEDs, they're found largely lacking in at least one regard over their older indicator cousins: charm. Where LEDs are cold and flat, the gentle orange glow of a neon lamp brings a lot to the aesthetics party, especially in retro builds.

Learn more: https://hackaday.com/2022/09/13/neon-lamps-not-just-for-pilot-lights/

Just add water

Most of the batteries we use these days, whether rechargeable or not, are generally self-contained affairs. They come in a sealed package, with the anode, cathode, and electrolyte all wrapped up inside a stout plastic or metal casing. All the reactive chemicals stay inside.

However, a certain class of magnesium batteries are manufactured in a dry, unreactive state. To switch these batteries on, all you need to do is add water! Let's take a look at these useful devices, and explore some of their applications: https://hackaday.com/2022/10/04/thank-magnesium-for-water-activated-batteries/

Notes on our new C4FM repeater

Rick N6PSP

This article was taken from the Desert RATS (Palm Springs, CA) October 2022 newsletter, the RATS Nest and nicely describes their new Yaesu repeater. It is similar to our SARC North Repeater so it is reproduced here as a guide.

Our club repeater has a split personality. Club members can easily task the repeater by connecting to rooms around the world for 30 minutes at a time using C4FM mode on the WD6RAT repeater. A Yaesu Fusion radio is your gateway. Maybe you have friends in the EU. Connect to room 41755 for the Northwest Fusion Group in Fleetwood Lancashire, UK. Or, a popular room is America Link which frequently has 100 people attached to it from around the U.S. and the world. Press and hold the Dx button on your Fusion radio to access the Wire-X menu. Then select Search & Direct to search all nodes or search for a named room or enter the room number of your favorite to dial straight to it. See Yaesu's Wires-X page for more details: https://www.yaesu.com/jp/en/wires-x/

If you are new to Wires-X on a Yaesu Fusion Radio, you can access the digital transceiver by selecting the Desert RATS frequency 146.940 MHz *[147.360 MHZ for SARC]* and tap the Dx button on the radio. This will toggle you from FM to DN. One of them will have a line over the letters. The line indicates Auto Mode Select (AMS). While in AMS, your radio will listen for both analog (FM) and digital (DN- Digital Narrow) signals and switch to the appropriate mode to hear the signal being received. Our repeater does the same thing.

Our Fusion / Wires-X WD6RAT repeater affords our C4FM members the opportunity to participate in national and international nets.

Weekly we will be connecting the WD6RAT repeater to the Digital Learning Net on Wednesdays at 6:00pm where they take Q & A about everything digital radio. On Saturdays at 6:00pm the International Wires-X net will be connected where amateurs check in from around the world.

This new repeater is more sensitive in both analog and digital mode. Our member J., KM6NUY has checked in from his home in Brawley on both analog and digital. While in New Hampshire he connected to our clubs Wires -X room 00080 sounding like he was still here in the valley. C4FM is considered by most people to be the best sounding and easiest to use of all the digital voice modes.

I am aware of at least 7 club members already using C4FM on our WD6RAT repeater. Others are hoping for Santa to help them into a Fusion radio soon. Members Jim KN6AYW, Jim W6UJX and I checked into the International Net on Saturday Oct. 8 and will likely join the Digital Learning Net on Wednesdays at 6:00pm.

Digital voice is ideal for those who are restricted by HOAs that won't allow antennas of any kind. If you can check into our weekly "RATS" net, you can access Wires-X with a Yaesu radio on our repeater. Join us on C4FM and talk around the world!

~ Rick N6PSP

With thanks to Rick and the Desert RATS

No-Ham Recipes

Rose-Marie Battig KB4RM

Cranberry-Pistachio Biscotti

Rose-Marie, decidedly a biscotti fan, has one each day at tea with her husband. For biscotti to be at their best, they need to be twice-baked. So often in bakeries and in some gourmet stores, you find biscotti that have been baked only once. These biscotti are too soft to be truly great. It's that not-too-sweet, crunchy texture juxtaposed with some nuts and the sweetness of bits of dried fruit that make biscotti truly irresistible. Try these, and become a biscotti lover!

¼ cup (65 ml) mild olive oil

¾ cup (200 ml) granulated sugar

2 teaspoons (10 ml) vanilla extract

½ teaspoon (2.5 ml) almond extract

2 eggs, large

1¾ cups (450 ml) unbleached white flour

¼ teaspoon (1.25 ml) fine sea salt

1 teaspoon (5 ml) baking powder

½ cup (125 ml) dried cranberries

1½ cups (375 ml) unsalted, shelled pistachios

Preheat oven to 300F (150C or a slow oven).

Spray a cookie sheet with vegetable oil and line it with parchment, Use an electric mixer to blend the olive oil and sugar together, Add the almond extract, vanilla extract and eggs, and beat until mixture is well blended.

In a small bowl, thoroughly whisk together the flour, salt and baking powder. Set the electric mixer to low speed and gradually add the flour mixture to the egg mixture. Slowly beat in the cranberries and pistachios.

Divide the dough in half. The dough may be sticky; rinse your hands in cool water and put a bit of mild olive oil on them before the next step. On the cookie sheet, form each half into a log about 12 inches long and 2 inches wide. Space logs about 4 inches apart.

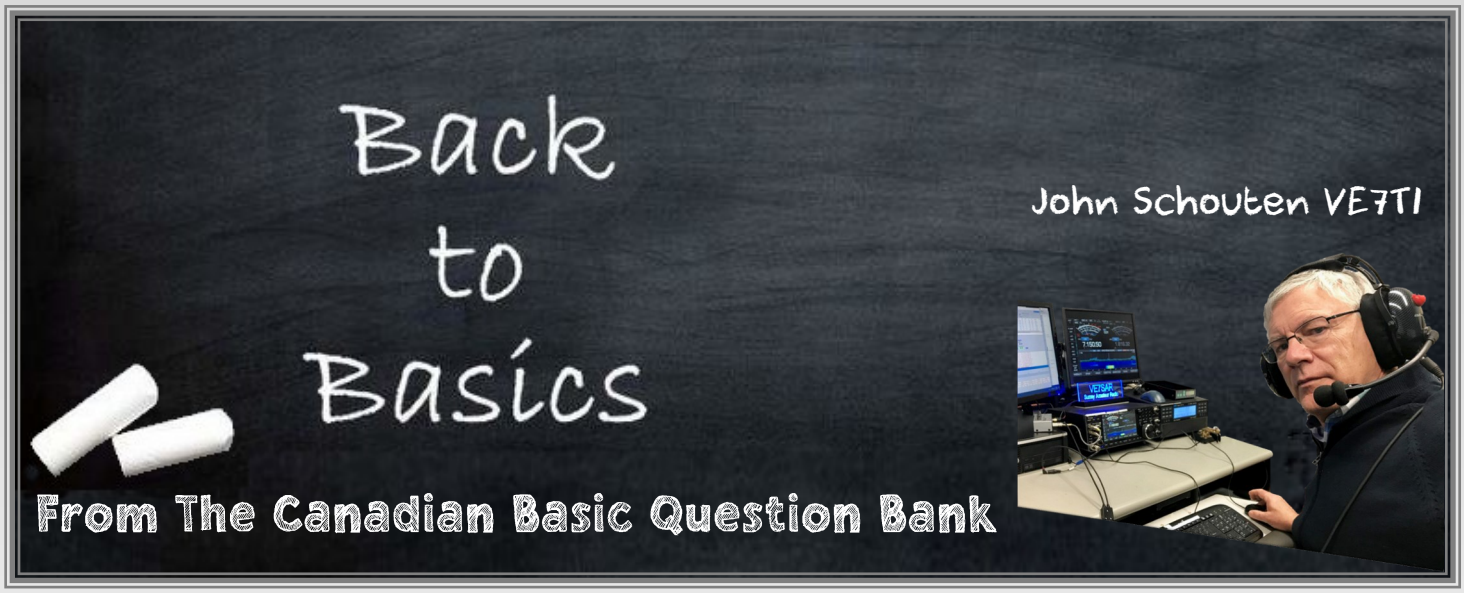
Bake on a rack in the centre of your oven for about 35 minutes or until logs are light brown. Then remove them from the oven and reduce the temperature to 275F (140C or a very slow oven). Allow logs to cool on the baking sheet for 10 minutes.

With a large metal spatula, remove the logs to a cutting board. Using a long, sharp knife, cut each log along its width, but slightly on the on the diagonal. Make each slice ¾ inch thick. Place each slice on its side on the cookie sheet, and then place the cookie sheet in the oven. Bake biscotti for 8 to 10 minutes, or until the newly exposed sides of the slices are light brown.

Cool biscotti on a rack and store them in a tin, between sheets of parchment or waxed paper. They can be kept at room temperature for up to 2 weeks. They freeze well and can be stored much longer than at room temperature.

Makes 36 addictive biscotti.

~ Rose-Marie KB4RM



Another look at Standing Wave Ratio (SWR)

Standing waves… a topic that often generates puzzled looks in our Basic classes. Lets have another look at the subject to see if we can bring some clarity.

Here is one of several questions from the Canadian Basic Question Bank:

B-6-5-1: What does an SWR reading of 1:1 mean?

A. The best impedance match has been attained

B. An antenna for another frequency band is probably connected

C. No power is going to the antenna

D. The SWR meter is broken

In short… SWR is a measure of the impedance match in the antenna system. A Standing Wave Ratio of '1 to 1' is an ideal condition indicating no reflected energy. The impedance of the load at the end of the transmission line matches the characteristic impedance of the transmission line and impedance match has been achieved. An SWR of '1.5 to 1' would indicate a fairly good match while a very high SWR would indicate a short-circuit or an open-circuit somewhere along the transmission line.

Typical 50Ω impedance coax

'Standing waves' result from the interaction of the forward power sent from the transmitter towards the antenna and the reverse power reflected back by an improper impedance match. The interaction produces a repeating pattern of voltage peaks and troughs along the line. SWR is also known as 'Voltage Standing Wave Ratio (VSWR)': it is a measure of the peak voltage to the minimum voltage on the standing wave.

First, a refresher. What is impedance?

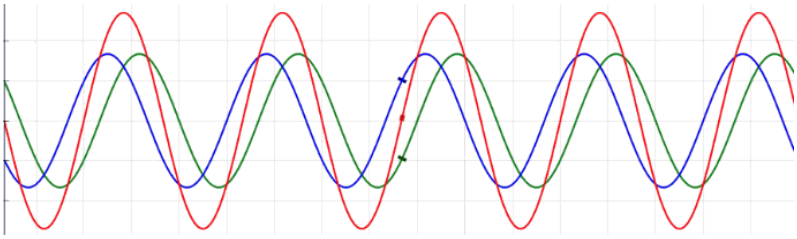
Impedance is the opposition to alternating current presented by the combined effect of resistance and reactance in a circuit. Remember, resistance can exist in either an AC or DC circuit, whereas reactance is purely an AC form of resistance caused by capacitive and inductive effects. The combination of resistance and reactance is impedance and it is measured in Ohms.

Then what is 'characteristic impedance'?

Mathematically, the characteristic impedance transmission line is the ratio of the voltage and current of a single wave propagating along the line; that is, a wave travelling in one direction in the absence of reflections in the other direction. Simply stated it is the impedance in Ohms of that type of transmission line, be it coaxial cable, ribbon lead or open wire line. Characteristic impedance is determined by the geometry and materials of the transmission line and, for a consistently constructed line (no breaks, flaws, or changes in type), is not dependent on its length; a one inch length has the same characteristic impedance as a 100 metre length.

A transmitter wants to see all of its RF output travel down the transmission line and out the antenna. If all components of this path are the same impedance then we are said to have a 'match', no power is reflected back and the SWR should be 1:1. If something does not match we say that there is a mis-match. When this happens, some power is reflected back to the transmitter. That becomes an issue, because too much power reflected back not only lessens the power being sent out through the antenna, but it is also harmful to our transmitter if the mis-match is significant enough.

Such a mismatch results in standing waves along the transmission line which magnifies transmission line losses (significant at higher frequencies and for longer cables). The SWR is a measure of the depth of those standing waves and is, therefore, a measure of the matching of the load to the transmission line. A matched load would result in an SWR of 1:1 implying no reflected wave. An infinite SWR represents complete reflection by a load unable to absorb electrical power, with all the incident power reflected back towards the source.



A standing wave (red) created by the superposition of a left traveling (blue) and right traveling (green) wave. At any single point the blue and green values add or subtract creating the red standing wave pattern.

Typical amateur radio RF sources such as transmitters are designed to look into a purely resistive load impedance such as 50Ω, corresponding to common transmission lines' characteristic impedances. So in practice, a good SWR (near 1:1) implies a transmitter's output seeing the exact impedance it expects for optimum and safe operation.

Practical implications of SWR

The most common case for measuring and examining SWR is when installing and tuning transmitting antennas. When a transmitter is connected to an antenna by a feed line, the impedance of the antenna must match the characteristic impedance of the feed line in order for the transmitter to see the impedance it was designed for (the impedance of the feed line, usually 50 or 75 ohms).

Particularly at HF frequencies, the impedance of a particular antenna design can vary due to a number of factors that cannot always be clearly identified. This includes the transmitter frequency (as compared to the antenna's design or resonant frequency), the antenna's height above and quality of the ground, proximity to large metal structures, and variations in the exact size of the conductors used to construct the antenna.

When an antenna and feed line do not have matching impedances, the transmitter sees an unexpected impedance and a reflected wave not absorbed at the antenna, so it

might not be able to produce its full power. The reflected power in the transmission line increases the average current and therefore losses in the transmission line compared to power actually delivered to the load. It is the interaction of these reflected waves with forward waves which causes standing wave patterns, with the negative repercussions noted.

Matching the impedance of the antenna to the impedance of the feed line can sometimes be accomplished through adjusting the antenna itself, but otherwise is possible using an antenna tuner, or an impedance matching device such as a balun. Typically in HF transceivers, installing a tuner before the feedline and the antenna allows for the transceiver to see a load close to its desired impedance, while sending most of the transmitter's power (a small amount may be dissipated within the tuner) to be radiated by the antenna despite what might otherwise be an unacceptable impedance.

A better match of the antenna to the feed line, that is, a lower SWR, becomes increasingly important with increasing frequency, even if the transmitter is able to accommodate the impedance seen (or an antenna tuner is used between the transmitter and feed line).

Methods of measuring SWR

SWR is the maximum divided by the minimum voltage, so it can be displayed on a meter either in analog (a needle meter movement) or digitally.

The common type of SWR / power meter used in amateur operation may contain a dual directional meter movement. The computations can be done mathematically in analog or digital form or by using graphical methods built into the meter as an additional scale or by reading from the crossing point between two needles on the same meter. The above measuring instruments can be used "in line" that is, the full power of the transmitter can pass through the measuring device so as to allow continuous monitoring of SWR.

Bridge circuits can be used to directly measure the real and imaginary parts of a load impedance and to use those values to derive SWR. These methods can provide more information than just SWR or forward and reflected power. Stand alone antenna analyzers use various measuring methods and can display SWR and other parameters plotted against frequency. By using directional couplers and a bridge in combination, it is possible to make an in line instrument that reads directly in complex impedance or in SWR. Those of our Basic course students that have attended our antenna workshops and have built a functioning 2-metre antenna have used our analyzer to examine the resonance and other characteristics of their creation.

So, back to our question…

B-6-5-1 What does an SWR reading of 1:1 mean?

A. The best impedance match has been attained

B. An antenna for another frequency band is probably connected

C. No power is going to the antenna

D. The SWR meter is broken

An SWR of 1:1 is a perfect match. All the power generated by the transmitter is being radiated at the antenna without any being reflected back.

~ John VE7TI

HAMpuzzle V1.2

Our new students are often confused by the block diagrams for receivers and transmitters. A freeware program to practice assembling block diagrams for the Canadian Amateur Radio Basic certification exam runs under Microsoft Windows (but also works flawlessly on Ubuntu 10.04 + Wine 1.2.2)

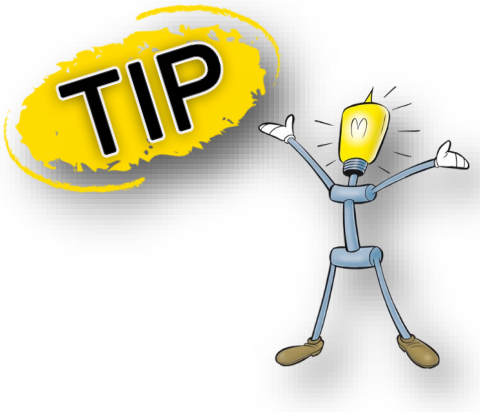
HAMpuzzle V1.2 (2014 04) https://www.rac.ca/wp-content/uploads/2014/04/HAMpuzzle/HAMpuzzle12.zip

Be sure to download at least one set of Diagrams from the web page and deposit the bank(s) in the same folder as the program. For Basic: https://www.rac.ca/wp-content/uploads/2014/04/HAMpuzzle/HAMpuzzle_Diag_Basic.zip

Radio Amateurs of Canada is pleased to make the HAMpuzzle© program available and extends sincere thanks and congratulations to François Daigneault, VE2AAY, for writing and providing it as freeware to anyone wishing to download it.

~ RAC

Do you need more information about our courses?



Study Links for more information

Whether you are new to the hobby or brushing up on skills, you should find these study links helpful:

1. RIC-7 is the entire up-to-date Industry Canada (IC) Basic Question Bank. http://tinyurl.com/CanadaBasicQB
2. Industry Canada (ISED) on-line practice page: https://apc-cap.ic.gc.ca/pls/apc_anon/apeg_practice.practice_form
3. The Amateur Radio Exam Generator is at: https://www.ic.gc.ca/eic/site/025.nsf/eng/h_00040.html
4. The ExHaminer Study software for Windows is at: https://wp.rac.ca/exhaminer-v2-5/
5. VE3YT has an excellent question-based guide available at ve3yt.com

Contact SARC if you wish to write the Basic or Advanced Exam. If you pass we'll even give you a year free as a SARC prospective member!

Newly Licensed? When you receive your paper license in the mail, it will come with a form that can be filled out and mailed to the Radio Amateurs of Canada office, at which point an introductory RAC one-year membership will be set up. Introductory memberships are identical to our existing basic memberships and you will receive The Canadian Amateur magazine for one year.

SURREY AMATEUR RADIO

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City of Surrey
separ
Surrey Emergency Program Amateur Radio
https://separ.ca/

SARC
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http://ve7sar.net

RTL-SDR course

Professor Jason from Harvery Mudd College in California has recently uploaded a 23-lesson video series on software defined radio digital signal processing (DSP) concepts that can be learned with an RTL-SDR, PlutoSDR and GNU Radio.

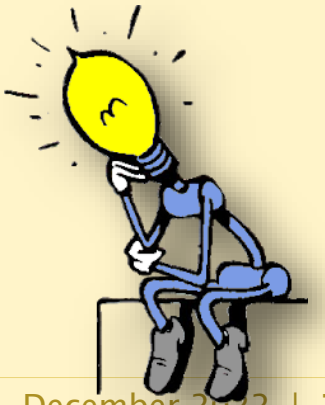
If you're looking for a University level introduction to DSP this looks like a good hand on approach to learning. It covers concepts from a simple FM radio receove in GNU Radio, to doppler radar with PlutoSDR, to digital modulation, pulse shaping, GPS reception and more.

All the GNU Radio flowgraphs are available on their class GitHub as well.

Those pesky block diagrams

Our new students are often confused by the block diagrams for receivers and transmitters that are part of the Canadian Basic Amateur Radio Question Bank, and it is frequently mentioned in our course feedback as one of the more challenging lessons. As we have previously mentioned, there is a freeware program to practice assembling block diagrams called 'Ham Puzzle available as a free Windows download from Radio Amateurs of Canada at: https://www.rac.ca/wp-content/uploads/2014/04/HAMpuzzle/HAMpuzzle12.zip

Even with Ham Puzzle our students continue to look for a better way to commit these block diagrams to memory. If you, or your club, are involved in instruction and you have a memory aid, we'd love to pass it on to our students.



~ *John VE7TI*
VE7TI@rac.ca

November 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1 1930 SEPAR Net **2000 SARC Net**	2	3	4	5 Coffee: 0700-0830 Denny's 6850 King George Blvd., Surrey OTC Open—10-Noon
6	7 On-line Basic Course 19:00 hrs	8 1930 SEPAR Net **2000 SARC Net**	9 **SARC Meeting** 1900-2100	20	11 Remembrance Day 	12 Coffee: 0730-0930 Denny's OTC Open—10-Noon—Basic Course Antenna Workshop Contest: WAE RTTY Contest and **2m local QSO party**
13 Contest: WAE RTTY Contest	14 On-line Basic Course 19:00 hrs	15 1930 SEPAR Net **2000 SARC Net**	16	17	18	19 Coffee: 0730-0930 Denny's OTC Open—10-Noon
20	21 On-line Basic Course 19:00 hrs	22 1930 SEPAR Net **2000 SARC Net**	23	24 **SEPAR Meeting** 1900-2100	25	26 Coffee: 0730-0930 Denny's OTC Open—10-Noon Contest: CQ WW DX Contest (CW)
27 Contest: CQ WW DX Contest (CW)	28 On-line Basic Course 19:00 hrs	29 1930 SEPAR Net **2000 SARC Net**	30 1900 SARC Exec Meeting			

For details on all SARC events, go to ve7sar.net

Contest Details: http://hornucopia.com/contestcal/contestcal.html

DECEMBER 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	For details on all SARC events, go to ve7sar.net			1	2	3 Coffee: 0730-0930 Denny's 6850 King George Blvd., Surrey OTC Open: 10-Noon
4	5 On-line Basic Course 19:00 hrs	6 1930 SEPAR Net 2000 SARC Net	7	8	9	10 Coffee: 0730-0930 Denny's OTC Open: 10-Noon
11	12	13 1930 SEPAR Net 2000 SARC Net	14 SARC Meeting 1900-2100	15	16	17 Coffee: 0730-0930 Denny's OTC Open—10-Noon Contest: RAC Winter Contest (CW, phone)
18 Contest: RAC Winter Contest (CW, phone)	19	20 1930 SEPAR Net 2000 SARC Net	21	22	23	24 
25 	26	27 1930 SEPAR Net 2000 SARC Net	28 1900 SARC Exec Meeting	29 SEPAR Meeting 1900-2100	30	31 Coffee: 0730-0930 Denny's OTC Open—10-Noon

Contest Details: http://hornucopia.com/contestcal/contestcal.html

How often has an operator said that they would like to participate in a QSO party, but cannot do HF at their QTH? Here is a way they can join us, on 2m! This year, we have added SSB as well as FM.

On November 12, 2022, Saturday from 10:00 -14:00 PST, let's have a Party on 2m, FM or SSB. Use an FM simplex frequency between 146.415 and 147.570 MHz, or an SSB frequency between 144.200 and 144.275MHz.

Contest is open to all certified amateurs. Each QSO must have one station within Metro Vancouver, Vancouver and Gulf Islands, Southwest BC (Grids CN79, CN89 and CN99) or Northwest WA (only Grid Squares along the Canada-USA border: CN78, CN88, CN98) in order to be considered for points.

- Radios will be classified by power as QRP (10w or less), MED (11-49w), HIGH (50w or higher)
- Points will be given for the correct exchange of Callsign, Power class, Municipality.
- Stations may be MOBILE (calling from multiple Municipalities), or FIXED (one Municipality).

Each FM station worked is worth one point. Each SSB station worked is worth 2 points. A Fixed station may be worked only once in each mode, while a Mobile station may be worked more than once if it has moved to a different Municipality. 10 bonus points for each municipality that you contact. 10 bonus points for each municipality you are transmitting from. [*Shhhhh, your first contact could be worth 21 points (10+10+1 points*)].

Valid FM operating frequencies include 146.415, 146.430, 146.445, 146.460, 146.475, 146.490, 146.505, 146.535, 146.550, 146.565, 146.580, 146.595, 147.420, 147.450, 147.480, 147.510, 147.540, 147.570 MHz. Valid SSB operating frequencies are between 144.200 and 144.275. (ref: https://wp.rac.ca/144-mhz-2m-page/).

Electronic log files to be submitted in XLS or gSheet format to qsoparty@radioroom.ca by Nov 30, to be included in the scoring. No prizes will be awarded, but lots of admiration from your peers.

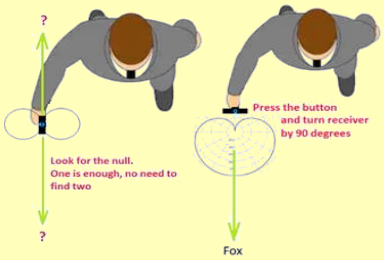
For further information, contact qsoparty@radioroom.ca

~ *Hiroshi VA7LET*

The popularity of 80 m foxhunts is increasing because of the better directional characteristics (with less reflections) of HF versus 2m

The RX80M is the second generation of the popular directional foxhunt receiver designed by Les Tocko VA7OM and produced by Dave Miller VE7HR.

The RX80M receiver tunes 3.51 MHz to 3.60 MHz and is ready to use, complete with 9v battery, antenna, earbuds and internal 100 dB attenuator. Sensitivity is 0.4 uV for 10 dB signal to noise ratio.



Determine the general direction of the fox with the RX turned broadside, then home in precisely on the null using the button with RX turned sideways. An instructional video describing this technique at https://youtu.be/YK3gETNc2jU.

To order the RX or TX contact JohnVA7XB@gmail.com

The TX80M is a joint project of Les Tocko VA7OM, Dave Miller VE7HR and Chris Scholefield
This is a non-profit volunteer project of SARC in support of amateur radio

80m ARDF foxhunt receiver

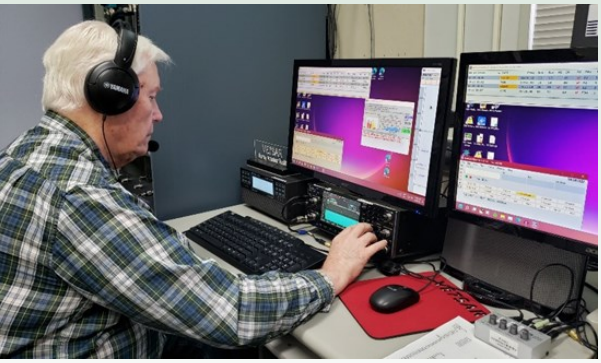
C$125 + shipping

The Contest Contender
VE7SAR

John Brodie VA7XB

CQ WW DX contest for SSB

With the wind blowing and rain pounding down outside during the first serious storm of the Fall season, it was a perfect weekend for contesting. Despite poor propagation predictions for the higher bands, we nevertheless anticipated promising conditions under rising sunspot numbers, and were not disappointed.



Our 9-member team was comprised of Sheldon VA7XH, Thomas VE7TXL, Jan VA7VJ, Robert VA7FMR, Andrew VA7LGN, John VE7TI, Manvir VA7BKI, John VA7XB and Jeanne VA7QD, an experienced contest operator who was participating with SARC for the first time.

To operate in the multi-single category we made use of our Icom IC-7610 exciter, Expert Linear 1.5 amplifier running 1 kw to a TH7 multi-band beam, all of which performed without problems. Fortunately, both the Spid rotator and controller had been earlier repaired by Steve VE7SXM, and were up to snuff.

The team operated all times except the after-midnight hours on Saturday and Sunday. By 9 am both days European stations were starting to emerge and activity picked up rapidly thereafter. All bands between 80m and 10m were open at some time for extended periods, and even 40 and 80m held up during the late evening hours despite our "compromise" wire antenna.

Noteworthy DX prefixes worked included: 3B8 (Mauritius), 4X (Israel), 9K (Kuwait), 9M2 (Malaysia), YB (Indonesia), HZ (Saudi Arabia), JT (Mongolia), P2 (Papua New Guinea), V8 (Brunei) and SV5 (Dodecanese) for a total of 91 countries on all continents except Antarctica. In the windup hours, Jeanne was kept super busy with deep pileups from US callers throughout her shift to push the final count up to 1006 contacts for a claimed score of 677730 points. Well done, all!

~ John VA7XB

Robert VA7FMR and Jeanne VA7QD

Contest Online ScoreBoard

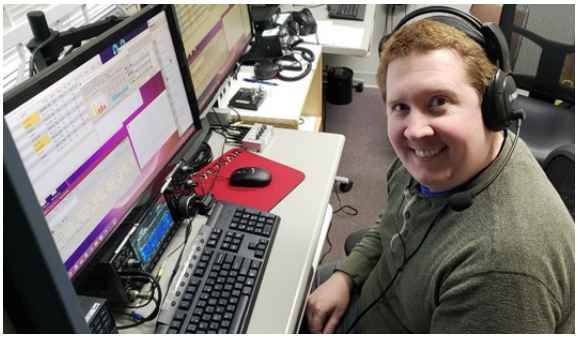
31 Oct 2022 14:33 UTC CQ WW SSB (29 Oct 00z - 31 Oct 00z)

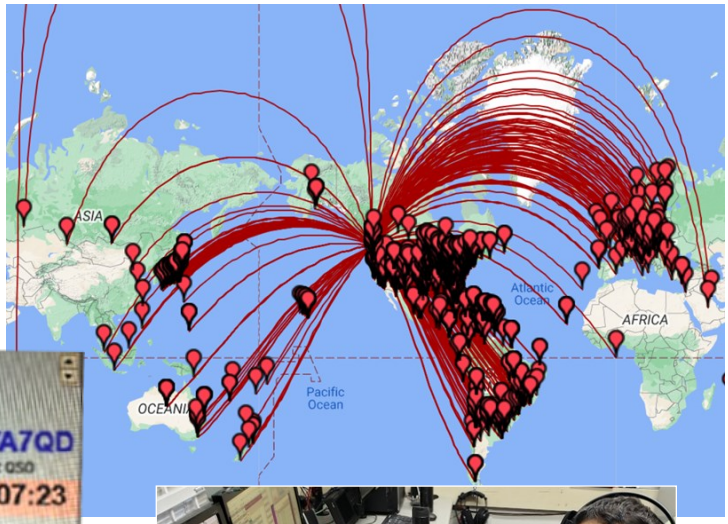
Closed: CQ WW SSB Go

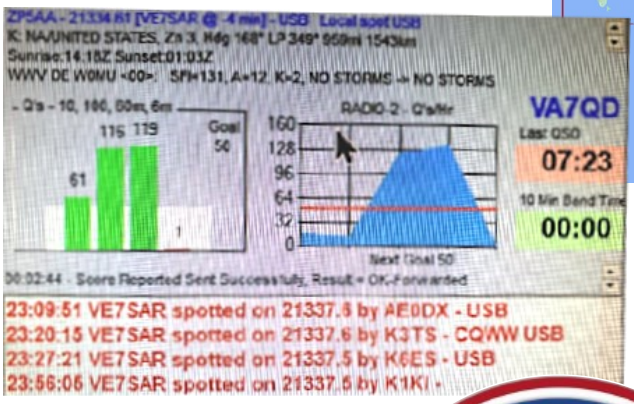
Highest rate: 449 q/h by EA8RM

Home Profile Filter View Clear Filter Breakdown Clubs Teams Manual post Archive Supported contests Help with logger set up

M/S HP		Score	QSO	Mult	Countries	Zones	Last	
1	K9RS	7,687,449	4,057	693	540	153	14:19	Frankford Radio Club
2	VC3U	4,337,856	2,871	612	472	140	14:19	Yankee Clipper Contest Club
3	N4UU	3,657,575	2,400	575	445	130	14:33	Florida Contest Group
4	NA2U	3,453,845	2,607	565	418	147	14:19	Arizona Outlaws Contest Club
5	NJ4P	2,942,984	1,718	631	483	148	14:24	Deep Dixie Contest Club
6	N4SS	2,669,952	1,751	544	418	126	16:19	Kentucky Contest Group
7	K3AJ	2,514,120	1,766	511	392	119	14:19	Potomac Valley Radio Club
8	K9YY	2,032,452	1,519	486	361	125	14:22	Society of Midwest Contesters
9	AD4ES	1,732,528	1,248	496	375	121	14:19	Florida Contest Group
10	NC1CC	1,265,260	1,095	410	313	97	14:19	Yankee Clipper Contest Club
11	W7VJ	691,440	742	344	242	102	14:23	Bavarian Contest Club
12	VE7SAR	677,730	1,006	285	194	91	14:21	Surrey Amateur Radio Communications
13	V48DM	362,115	1,254	117	89	28	17:26	







Top left: Andrew VA7LGN, right: Manvir VA7BKI, bottom: Jan VA7VJ

Local Ham Gear For Sale

More listings at hamshack.ca

For sale is a **Kenwood matching speaker** (blue-grey), model SP-70. The Kenwood SP-70 is a great addition to your TS-400 or the TS-700A series transceivers.
It features a 4.75 inch speaker element and can handle up to 2.5 Watts. This 8 ohm speaker has a frequency response of 300 to 5000 Hz.
The rear panel has screw terminals. Measures 6.5 x 4.875 x 7.875 inches 3 lbs

Asking $50 For the above, contact: John VE7TI ve7ti@rac.ca

The Icom IC-T2H looks and feels more like a commercial radio rather than a HAM radio, and that's what makes this radio so good. This transceiver is built to military specs.
– High power (5 W or 1 W). High power gives superb range. Regular rechargeable plus an AA-size battery case, intuitive programming, important functions have their own button, large speaker = good loud audio and a large PTT. BNC antenna connection that is much more versatile than SMA
This unit comes with a case, 'rubber duckie' flexible whip antenna, an Icom speaker mic, charger, programming cable, the factory rechargeable battery plus the AA battery shell. The manual. The biggest plus is that you can use normal AA-size rechargeable or regular batteries so you never have to worry about buying new (= expensive) original battery packs. $85

Contact: John VE7TI ve7ti@rac.ca

1. CTEK Model US3300 battery charger $50 see the manual at: manualslib
2. Sinclabs SP12 power supply 12v 12Amp $20

Contact: John VA7XB va7xb@rac.ca

If anyone has a mobile radio with a detachable head that has an alphanumeric display that I could either buy or trade for. I have an Icom 2720 in great condition, unfortunately it does not have an alphanumeric display and makes me carry a cheat sheet, I'm not at the point where I can really remember the frequencies.

Ralf Stewart: VE7IHE@outlook.com

Radio-Active

Profiles Of SARC Members

Horace Bong was born in Singapore and migrated to Canada with his wife Gracie when their son was less than a year old. He and his wife met when they were both working in the Singapore Air Force. They moved to Canada with hopes of cultivating a more family-oriented, carefree and broader outlook to life.

Horace's grandparents migrated from China to Malaysia and his parents from Malaysia to Singapore. He wonders where the next generation will go. They have no relatives here in Canada, but have come to call some very good friends their "Canadian family".

Horace's interest in IT started back in the late 1980s. He is self-taught and tinkered around with technology out of personal interest, which helped him later on in his job as a warehouse manager.

As a teenager growing up in Singapore, Horace learnt about Ham radio through foreign magazines. Back in those days, there was no Internet or cell phones. He was fascinated and thought that it was cool to be able to talk to people from all over the world. However, he lacked the resources and opportunity to take up the hobby.

Fast forward to the spring of 2018 when Gracie attended an emergency evacuation seminar for her office building where the invited speaker shared about his Ham radio hobby. Gracie remembered Horace's interest in Ham radio and thought that it would be a useful and fun bonding activity for the family to do together. They registered for a basic course in the fall and the family of 3 went on to obtain Basic with Honors qualification. Although the result was good, what touched Horace most was the process of the family members helping each other and formulating study strategies together. He went on to achieve the Advanced qualification in April 2019.

After obtaining the basic qualification, Horace participated in activities at many neighbouring clubs. During a ShakeOut BC emergency exercise, he realized that he could only communicate with fellow Hams in the Surrey area where he works. He then decided to join the Surrey Amateur Radio Communications.

Horace finds SARC/SEPAR members very welcoming and inclusive, helping new members assimilate easily. He attends Saturday breakfast gatherings and then goes to the clubhouse (aka "the OTC") for

Horace Bong
VA7HXB

further fellowship and other Ham activities. The clubhouse is where many workshops and discussions are conducted. Each club has its own focus or specialty and he has gained a broader understanding and knowledge of Ham radio through these activities. He encourages every Ham to participate in the variety of Ham activities such as field day, meetups and hamfests.

Horace has worked with his current company for over 25 years implementing a warehouse bin location system, which is so easy to use that even a new hire can be productive from Day One. He introduced other technological improvements such as equipping every salesman with an iPad to replace the brochures they had to lug around in big, heavy bags – an industry innovation at the time.

When he was a new immigrant, Horace encountered difficulties in applying for jobs as he did not have any Canadian work experience. He got his first job at a beauty supply wholesale distributorship. His next job was at another beauty supply distributorship warehouse where he was recognized for his work attitude and computer-related skills and was promoted to warehouse manager within 6 months. Today, he hires warehouse staff who have a good attitude and are willing to work hard instead of relying solely on prior Canadian work experience. The warehouse is now like a mini United Nations with staff from all over the world.

Horace thinks of himself as a "Modern Ham". He likes to bring more Internet and modern technology into Ham, which he feels makes this hobby more interesting as well as helps it to keep up with the times. These enable Hams to communicate with other Hams easily.

He has reconfigured SARC's Yaesu DR-2X repeater and connected it to the Internet for WiRES-X connectivity. It is now operating on the UHF frequency pair and connected full time to WiRES-X room 00047. Any Ham in the world can communicate to the users of this repeater when connected to this room. The repeater is situated near the King George MRT Station.

Embracing the Internet is his focus. As such, he is at home with digital modes like Fusion, Dstar, DMR, Allstar, FT8. Running his own nodes and hotspots allows him to experiment with various digital modes.

Without any knowledge or formal education in electric or electronics but armed with an attitude "I am sure I can achieve anything I put my mind to …", he bought a Solder Practice Kit and trained himself to solder. This was the start of his homebrewing/DIY journey and he has gone on to make a few homebrew projects.

"Cheers to a hobby that will last a life time"

~

General Meeting Minutes

October 12, 2022
SARC Monthly Meeting

Attendees: 25

Start Time: 7:05pm

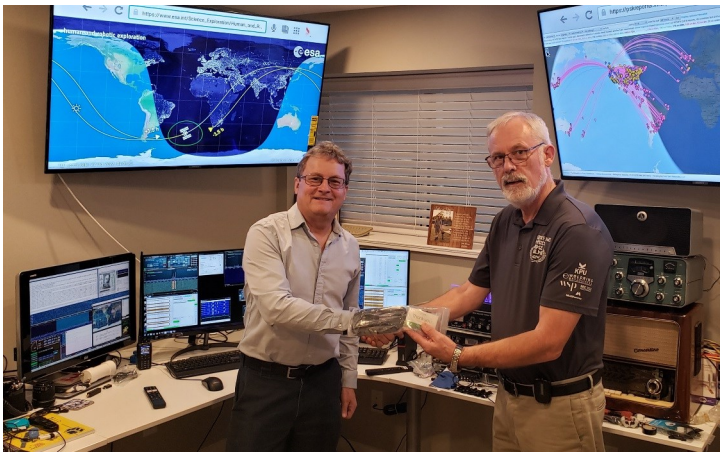
Location: Surrey Fire Training Centre

Several of the Directors were absent due to COVID.

Guest presenter

The guest presenter was Peter Vogel VE7AFV, whose articles have appeared several times in the Communicator over the years, including in this issue on page 10.

Peter talked about his month at the European Organization for Nuclear Research (CERN) and particularly the Large Hadron Collider in Geneva. Although the talk was about CERN and the LHC, Peter revealed parallels and connections to amateur radio.



Peter Vogel VE7AFV presents Gary Peare VE7GPR with an extensive SDR kit based on the NESDR SMArt from Noo-elec.

Gary won the kit as part of Peter's presentation to SARC on his time at CERN.

Business meeting

Following the presentation was a business meeting to bring members up to date on SARC and SEPAR activities over the past and coming months.

Welcome and Call to Order at 8:22 pm- (Gord Kirk VA7GK)

Announcements

Breakfast continues Saturday mornings at Denny' Restaurant at 68th and King George Blvd between 7am and 9am, at which time we move to the OTC located at 5756-142nd Street which is open from 10 am to 12 pm.

Committee Reports

Financial and Committee Reports - (Scott VE7HA Absent)

SEPAR - (Gord VA7GK)

SARC/SEPAR hosted a "Cruise-In" at the A&W 192nd St. in August. It was attended by Surrey RCMP, Surrey Fire Services and Surrey Emergency Program. This gave everyone a chance to show off their radio installations.

SURREY AMATEUR RADIO COMMUNICATIONS

Sept 10 "Run Surrey Run". The amateur radio community was asked to assist, with SEPAR responsible for net control.

Operations & Training Centre - (Gord VA7GK)

Work on the grey antenna tower, grounding, battery backups for the stations continues. Bigfoot trailer required road certification including new tires and brakes and a commercial vehicle inspection. The generator on Bigfoot had a failed voltage regulator which has now been replaced.

Membership - John VA7XB Absent

Membership stands at 109.

Contests - John VA7XB Absent

Oct 29-30th is the CQ WW DX Contest for SSB. If interested in participating contact John Brodie.

Nets - John VA7XB Absent

Gary VE7GPR has stepped up to help as a net controller. We are always looking for more net controllers as backups for SEPAR or SARC.

Repeater Update- Gord VA7GK

The North UHF repeater was changed to Fusion and WiresX. Details can be found on the SARC website. If you hear what appears to be interference it is more likely a digital transmission. The 220 repeater is still operational, and a 220 radio is also now installed at the OTC.

We previously retired and recycled the OLD GE Mastr II repeater at the South site and replaced it with the Yaesu repeater.

The Yaesu repeater has been relocated to the North site and a Motorola Quantar VHF Repeater is at the South site.

Our gin pole needs to be picked up from Art Witmans and returned to Fire Hall 11; it needs a truck or trailer for transport, as it is 16 ft. long.

Ham Class Training for 2022 - John S VE7TI Absent

202 students have been trained so far this year including the current course which is in progress.

Projects

Two Saturday mornings were recently devoted to construction of a 2m tape measure beam and attenuator under Les Tocko's guidance. Thanks to Les for the designs and organizing the build projects.

Dino has acquired all the components for the GPS/clock project. Construction of the boxes has turned out to be the most difficult phase and he is working on that with Thomas VE7TXL.

Old Business

(Gord Kirk VA7GK)

A&W Mobile Cruse-In – a successful, well attended event.

ICOM 9700 radio purchased and installed at OTC, but still needs a separate coax feed to the UHF side of the beam antenna.

220 Antenna and radio now installed at the OTC.

Bigfoot tower – new tires, mechanical certification and generator repairs completed.

Additional Grounding for the grey tower – in progress.

DC power infrastructure in the OTC completed.

Roof Cleaning – on going to prevent flooding.

New Business

(Gord Kirk VA7GK)

The Directors would like to replace the coax used to connect to the UHF and VHF Yagi on the grey tower. Art Witmans VE7WAE moved that we purchase 500 ft of LMR-400 ultraflex plus connectors for approx. $1250 as per quote. Seconded by Lata Witmans. Carried.

SURREY AMATEUR RADIO COMMUNICATIONS

Anton VE7SSD requested for an update on the CW Code oscillators. No details were available as Kevin was absent. Jeremy believes that Kevin VE7ZD and John VE7TI have a prototype and are discussing which parts to purchase next. Kevin is still working on producing a full kit that anyone could build on their own.

There was a question from the floor regarding SARC's bank accounts. Gord VA7GK stated that all of the funds, which were earned from ham classes and not from grants, continue to be spent for operating expenses and projects.

Next General Meeting – 7 pm, Wednesday Nov 9th. Presenter is Dino VE7XDT on "Neat Ham Projects You Can Build".

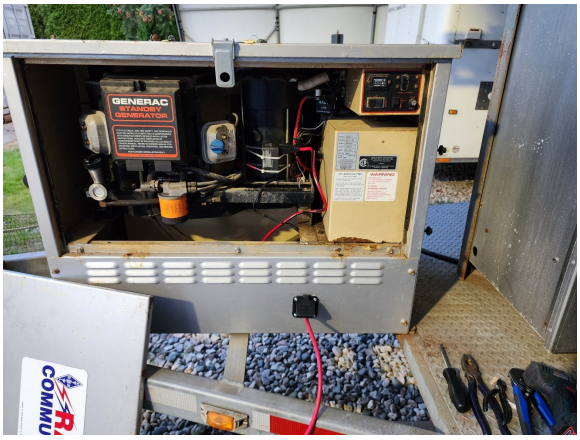
Reminder that Dec 3rd is the date reserved for the Christmas Party. We are still trying to gauge interest and looking for help organizing the event. An informal discussion took place after adjournment regarding a pot luck social at the OTC in lieu of a formal party. If Covid protocols change for restaurant or social gatherings we may need to adapt our plans accordingly.

Adjournment of the Business Meeting

Keld VE7GP moved to adjourn the meeting at 8:46 pm, seconded and carried.

~ Minutes prepared by Jeremy Morse VE7TMY

Project update…



A new regulator

Our 'Bigfoot' trailer suffered a generator failure at Field Day. Extensive troubleshooting eventually revealed that the regulator had failed. Thanks to the efforts of Miller-Tech Electric all is now functioning properly.

~ Steve VE7SXM

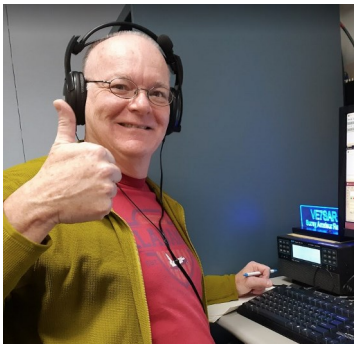
Club News, Amateur Radio Courses, Nets and Articles…

Amateur Radio Courses: https://www.rac.ca/amateur-radio-courses/

Radio Amateurs of Canada is pleased to continue to promote Amateur Radio Courses - including Basic, Advanced and CW which are being organized by clubs so please send them to us. For example, the Surrey Amateur Radio Communications (SARC) in partnership with the Surrey Emergency Program Amateur Radio (SEPAR), has an online class starting on September 19th.

SURREY AMATEUR RADIO COMMUNICATIONS

SARC News…



Thanks Kevin!

Kevin VE7ZD and his wife Laura VE7LPM have pulled up stakes in Burnaby and are moving to the Courtenay area of Vancouver Island. Kevin has been a tremendous SARC contributor as presenter, author, project leader and instructor for our Basic and CW courses. He has also served as a Director and his departure leaves a void in our club that will be difficult to fill. He promises to stay in touch and, although he has no column in this edition of The Communicator, he promises to return for the next issue.

We wish you and Laura all the best.

~ John VE7TI

On the 'Get well soon list'

Rick writes: "It was nice seeing everyone at the Cruise-In.

I just got home from open heart surgery on September 28th, after 21 days in hospital. There were a few complications and I can say I used up 3 of my 9 lives but I'm slowly getting stronger and should be able to drive by the end of October."

~ Rick VE7GMO

Another SARC Advanced certificate holder

Congratulations to Sheldon VA7XH who recently passed his Advanced exam.

~ John VA7XB

David Sinclair VA7DRS writes: "Diane and I have decided to sell and move up closer to our family. We found a couple of nice homes in Vernon. Our first choice is at the top of Okanagan Lake, complete with a private sandy beach.

Please pass the word on to the group."

~ David & Diane

SEPAR Report

Gord Kirk VA7GK
SEPAR Coordinator

The Great B.C. Shakeout

It looks like the normal fall weather has finally come to the Lower Mainland and Southern BC. We have had an unusually hot and dry fall with really no measurable precipitation. Some communities have found themselves enacting severe water restrictions to maintain water services to their residents. Compounded with the hot and dry weather, the normal forest fire season continued with local fires in surrounding communities, and at times extreme levels in poor air quality occurred due to smoke from those fires.

Now with the rain coming and the sudden changes in weather, including winds and risks of localized floods, we again are receiving weather warnings and reminders to be ready for some of the anticipated weather related events. The message of being prepared for unpredictable or sudden extreme circumstances seems to be a constant in everyone's lives these days.

For SEPAR this is a good reminder of why we plan and practice to support emergency communications.

Every October the annual 'Great BC Shakeout' occurs. On the third Thursday of October the province supports this exercise. SEPAR registers and participates in this. So at approximately 10:20 AM on October 20th the exercise happens.

Participants at home or work are expected to practice the drop, cover and hold-on exercise. The hope is that people will think about the seismic risk in the area we live, know what to during the shaking, and what to do once it stops.

The plan for SEPAR members is to have radio operators go to the VE7RSC local repeater to start an unscheduled net. In preparation for this exercise, the radio operators were reminded of the "planned earthquake" a few days before and also with a second email approximately ten minutes prior to the exercise. The ten

SURREY EMERGENCY PROGRAM AMATEUR RADIO

minutes until start email noted 'that you won't get a ten minute warning when the real thing happens'. The email detailed the simple plan:

Turn on your radio from wherever you are (work, home, shopping etc.) and try to check in after you do the following:

1. practice drop, cover and hold-on
2. make sure your family is safe
3. checking out the location you are at for damage
4. check in with a report of the above as well as letting net control know your current capabilities. This includes whether you have VHF/UHF/HF, digital capabilities and available power/backup power availability.
5. If you are going to list 'fictional damage' first use the words: "exercise, exercise, exercise" so we all know it is only part of the day's Great Shakeout.

This event was open to any amateur whether they were part of SEPAR or not. Participation is encouraged for all radio operators from Surrey or surrounding areas to check in.

The net control (myself VA7GK) was to record the list of check-ins and their situation report for the morning. The plan is to map out the general location for all of the check-ins to demonstrate to the city emergency services the instant ability the amateur community can provide to create a general 'windshield' or front porch 'survey' of the current conditions.

In a real event this information would be passed into the cities' EOC and at least one of our SEPAR members would attend to our radio room located in Surrey Fire Hall One where the EOC is stationed.

During the exercise we had 27 check-ins. These came from all corners within Surrey and all of the neighbouring municipalities surrounding the city, and included one check-in from our U.S. neighbours to the south. Located within our city, the Provincial Regional Emergency Operation Center (PREOC) for the district, also checked in. While any formal communications would flow through the proper chain of command (Surrey EOC to the PREOC) we were able to give a quick picture of the morning from our exercise participants. The PREOC radio operator noted our participation and reinforced to those on the air the chain of command needed by the PREOC all allow them to provide support to the entire region.

We also had a check-in from Thetis Island (one of the nearby southern gulf islands) fire station EOC with the comment it was important for their small community to know who they could reach during a disaster. This again shows it may not be our community where the disaster impacts but it may be another that we as amateur radio volunteers can help support.

During the event, participants were reminded the first person on the air after an earthquake (or some other event) can start the net. They simply take check-ins, document information, and then they can hand off to perhaps a better situated amateur or to the formal net control when the EOC radio room has been established.

As I was the net control station for this event we were able to practice an actual hand over when the first battery running my station ran out of power. I quickly switched to my hand held unit but the signal quality was obviously not as good. One of our other stations let me know how much weaker my signal was. The net control was then handed off to another station Manvir VA7BKI, who quickly established himself as net control letting the other stations know (with his much stronger signal) that he had assumed net control. During this time I was able to move to another radio with reliable power and good area coverage. Once set up, the

SURREY EMERGENCY PROGRAM AMATEUR RADIO

net control was passed back to myself (VA7GK) to resume net control.

It is my hope that those listening learned along with Manvir and myself how to deal with the unexpected challenges we may face when establishing and maintaining a net in unplanned circumstances.

One other area we reminded participants to 'test out' was their WINLINK system. In Surrey Ion VE7NL manages the weekly Winlink digital net for SEPAR. During his check-in to the 'Shakeout' net he reminded everyone to use the Winlink equipment to respond to an email he had sent out for the exercise. While a very simple part of the exercise, it may become extremely important to assist the city in passing messages should normal methods of communications be impacted.

While a very simple and short exercise, it helps to reinforce what amateur radio operators in Surrey should do to help our city during an emergency or disaster. The Great Shakeout was a practical demonstration of the weekly announcement on our Emergency Program net that states:

> *"A reminder that during an emergency or disaster all SEPAR members are asked to check-in to this repeater. If this repeater fails to respond, please monitor 146.550 MHz simplex for instructions."*

This is the reason each week we practice a net on the repeater as well as use simplex so everyone understands how we will communicate on the day or night an unplanned event occurs.

We look forward to seeing everyone and continuing to build a stronger Emergency Communications program within our city.

~ *Gord VA7GK*
SEPAR Coordinator

Name	Frequency	Offset	CTCSS
VE7RSC (Primary Repeater)	147.360	+0.600	110.9
VE7RSC (Secondary Repeater)	443.775	+5.0	110.9
VE7RPT (Primary Regional Repeater)	146.940	-0.600	Optional 136.5 Rcve
Simplex 1	(VHF) 146.550		
Simplex 2	(VHF) 147.420		
Simplex 3	(UHF) 446.550		
Simplex 4	(UHF) 447.425		

Other frequencies in the Greater Vancouver area:

Primary:	Coquitlam/Abbotsford	146.430
Primary:	Inter-Municipal Group 3	146.445
Primary:	Vancouver; Mission; Sec. Coquitlam	146.460
Primary:	Kent-Mission; Sec. Richmond	146.475
Primary:	Inter-Municipal Group 2	146.490
Primary:	New West; Sec. Richmond	146.505
National	Calling / FM Simplex Group I	146.520
Primary:	North Shore; Port Coquitlam	146.535
Primary:	Bowen Island; Surrey	146.550
Intermunicipal Group 1 Coordination		146.565
Primary:	Lions Bay/Vancouver/Delta/Langley	146.580
Primary:	Port Moody; Sec: Burnaby	146.595
Secondary:	Vancouver/Surrey	147.420
Secondary:	Vancouver (UBC) / Maple Ridge	147.450
Primary:	White Rock/Chilliwack; Sec. No. Shore	147.480
Secondary:	Burnaby/Pitt Meadows	147.510
Primary:	Delta; Sec: Abbottsford	147.540
Primary:	Hope; Sec: Delta; ALSO EMBC	147.570

SURREY AMATEUR RADIO COMMUNICATIONS

A donation from SFU…

The Simon Fraser University School of Engineering recently updated some of the teaching gear in their lab. SARC was asked if we would be interested in using this gear for servicing or instruction.

We currently have it in our container and we are looking for a place at the OTC to install it and a test bench… stay tuned.

The equipment includes:

- A dual function generator
- An FM Multiplex generator
- A spectrum analyzer
- An RF/Noise generator
- An AM/DSB/SSB generator
- An FSK Modem
- A frequency counter
- A dual audio amplifier
- A power supply, and more

Our contact at SFU is completing Ph.D. research into antenna design, and we have asked that consideration be given to coming to a future club meeting to give a presentation on the work and research being done. Hams everywhere are intrigued by antennas and antenna theory, and our membership would find anything on that subject very interesting.

~

Reprint Policies

These are policies for reprints from The Communicator, a bi-monthly journal about amateur radio and other topics published by Surrey Amateur Radio Communications (SARC).

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We welcome your comments and feedback

Please consider leaving a comment via email to communicator@ve7sar.net, or on our blog site https://ve7sar.blogspot.ca or, better yet, contact our authors directly, so they know someone is out there reading our publication.

Moving Forward…

Steve MacLean VE7SXM)

As we close off the summer of 2022 and the cooler weather rolls in, we take some time to review how we did this past summer and the projects that we managed to complete. We started off the summer with a successful Field Day 2022 at the end of June and then the following weekend was the Canada Day contest. We were able to bring out "Bigfoot" our 100' tower to the Operations and Training Center (OTC) for both contests. Bigfoot is a US Tower trailer, with a 100' telescopic tower that sports a TH7 10-15-20 meter tri-band Yagi and we were also able to extend our 40/80 meter wire line antenna to gain some additional height. However, as Bigfoot has not been used much over the past couple years, due mostly to COVID closures, we ran in to some issues and had to invest some funds for repairs, in the form of new tires and brakes, in addition to some generator repairs when the voltage regulator failed mid-deployment. We were able to overcome the initial issues and managed two successful contests from the OTC.

With all the COVID restrictions lifted in the area, we have been able to get back to our weekly breakfast at a local Denny's restaurant and OTC time on Saturday mornings, where we have been achieving upwards of 15+ in attendance. For a club of only 110 or so, that's pretty great turnout. After breakfast we move to our OTC, with various activities planned and where members can bring their projects or radios for assistance.

This summer we added a couple of new radios to the OTC, including an ICOM 9700 all mode transceiver as well as a 220 radio. We also moved our Yaesu Fusion repeater to our North Repeater site and it is now fully functional on Wires-X *[see the repeater update story in the Communicator for full details].*

The OTC radio room is now fully on 12v battery power for all radios and computers, and during field day we successfully ran the ICOM 7610 exclusively on battery power. As usual though there are always things to do and projects to complete as the work never ends.

In addition to everything we have accomplished this year, our hats go off to our incredible training team, that have trained over 200 new hams so far this year, and continue to produce high quality Ham radio operators, not just in Surrey but across many parts of Canada.

Looking forward to new things in 2023.

~ Steve VE7SXM

SARC SOCIETY DIRECTORS 2020-2021

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Steve Mclean VE7SXM
president at ve7sar.net

VICE PRESIDENT
John Brodie VA7XB
vicepresident at ve7sar.net

SECRETARY / WEBMASTER
Jeremy Morse VE7TMY
secretary at ve7sar.net

TREASURER
Scott Hawrelak VE7HA
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Gord Kirk VE7GK
(SEPAR Liaison)

Kevin McQuiggin VE7ZD / KN7Q

John Schouten VE7TI
(SARC Publications/Blog/Social Media & Courses)
communicator at ve7sar.net
course at ve7sar.net

Stan Williams VA7NF

SARC MEMBERSHIP, NET & CONTEST MANAGER
John Brodie VA7XB
membership at ve7sar.net

SARC QSL MANAGER
(pro tem) John Brodie VA7XB

SARC REPEATER MANAGER
Horace Bong VA7HXB
repeater at ve7sar.net

A look back…

From The Communicator—December 2012

Past Communicators are available at:
https://ve7sar.blogspot.com/search/label/SARC%20Communicator

November—December

The next General Meeting – 7 pm, Wednesday November 9th. The presenter is Dino VE7XDT on "**Neat Ham Projects You Can Build**".

Season's greetings to all, see you in January 2023!

SARC hosts an Amateur Radio net each Tuesday evening at 8 PM. Please tune in to the VE7RSC repeater at 147.360 MHz (+600 KHz) Tone=110.9, also accessible on IRLP node 1736 and Echolink node 496228.

On UHF we operate a repeater on 443.775MHz (+5Mhz) Tone=110.9 or IRLP Node 1737.

We are looking for a SARC Net Manager. Its not a difficult job and, if you have some time to spare, we'd like to hear from you. Basically it involves scheduling someone to do the Tuesday evening weekly net.

	SARC Net 20:00 Hrs
1st Tuesday Standby	Gary VE7GPR Reg VA7ZEB
2nd Tuesday Standby	Andrew VA7LGN Sheldon VA7XNL
3rd Tuesday Standby	Rob VE7CZV REG VA7ZEB
4th Tuesday Standby	Kapila VE7KGK John VA7XB
5th Tuesday Standby	Reg VA7ZEB John VE7TI
Want a turn at Net Control? Contact the SARC Net Manager	

Down The Log…

SARC Monthly Meetings

2nd Wed. (Sept-Jun)
1900 hrs at the Surrey Fire Service Training Centre, 14923 - 64 Avenue, Surrey, BC. Here is a what3words link and map: https://what3words.com/markers.addiction.ozone

Weekly SARC Social

Saturday between 0730 and 0930 hrs at the Denny's Restaurant, 6850 King George Blvd., Surrey BC

Workshops

Saturday between 1000 and Noon at the OTC 5756 142 Street, Surrey

SEPAR Net

Tuesday at 1930 hrs local on 147.360 MHz (+) Tone=110.9

SARC Net

Tuesday at 2000 hrs local on 147.360 MHz (+) Tone=110.9

VE7RSC Repeaters

2m North: 147.360MHz+
Tone=110.9Hz
IRLP node 1736
Echolink node 496228

1.2m: 223.960 Mhz -1.6
Tone=110.9Hz

70cm: 443.775MHz+
Tone= 110.9Hz
IRLP node 1737
WiRES-X Room ID 00047

2m South: 147.360MHz+
Tone=103.5Hz Fusion capable; No IRLP/EchoLink

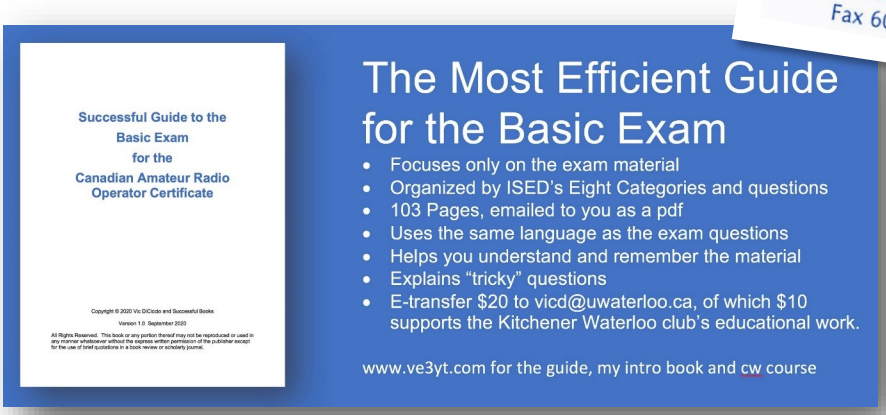
We Have A SARC Patch!

These are suitable for sewing on a jacket, cap or your jammies, so you can proudly display your support for SARC.

The price is $4 each or three for $10 and they can be picked up at a meeting or the weekly Koffee Klatch.

We thank our sponsors for their support of SARC

Please support them.



These folks did a great job on the electronics for our antenna trailer:

Miller-Tech Electric is a full-Service Electrical contractor and Kohler Power systems Authorized dealer specializing in supplying, Installing, and servicing Emergency Power systems. Our services are designed to tackle even the most complex projects. Contact us today to discover how we can help you be ready for the next power outage.

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